LIBRARY
RECEIVED
1933
Agricultur

THE PAPER INDUSTRY

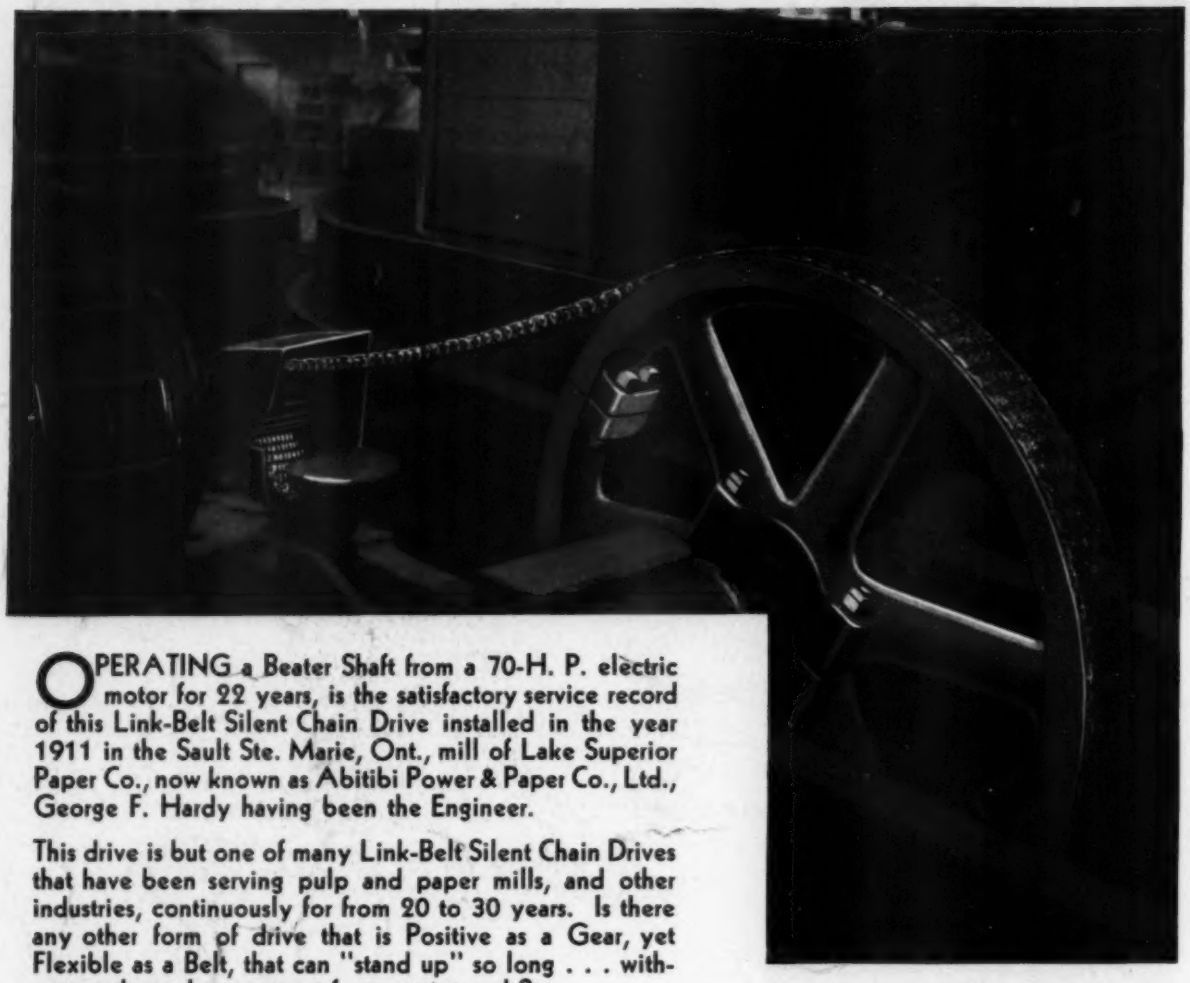
A MONTHLY EDUCATIONAL JOURNAL MAY, 1933

EASTWOOD

Wires are daily demonstrating their real value in average low tonnage costs. ¶ Furnished with EASTWOOD SEAM and EDGE in STRAIGHT and CRAFT WEAVE in BRASS and BRONZE. ¶ QUALITY and CRAFTSMANSHIP necessary to life in a Fourdrinier wire are maintained through rigid inspection. ¶ The test is not in one wire. Average life is what counts.

EASTWOOD-NEALLEY CORPORATION
BELLEVILLE, NEW JERSEY

22 years—and Still Running



OPERATING a Beater Shaft from a 70-H. P. electric motor for 22 years, is the satisfactory service record of this Link-Belt Silent Chain Drive installed in the year 1911 in the Sault Ste. Marie, Ont., mill of Lake Superior Paper Co., now known as Abitibi Power & Paper Co., Ltd., George F. Hardy having been the Engineer.

This drive is but one of many Link-Belt Silent Chain Drives that have been serving pulp and paper mills, and other industries, continuously for from 20 to 30 years. Is there any other form of drive that is Positive as a Gear, yet Flexible as a Belt, that can "stand up" so long . . . without costly replacements at frequent intervals?

The Link-Belt Silent Chain Drive maintains its initial 98.2% efficiency throughout the years, irrespective of moisture or atmospheric conditions. When equipped with our new improved Double Hat and Washer Type Casing, the oil is kept in, under all conditions. The casing-seals absolutely prevent oil leakage.

Link-Belt Silent Chain Drives are made in sizes up to 1000 H. P. and over, and drives ½ to 60 H. P. are available from distributors' stocks. Send for Data Book No. 125, and Stock List No. 725.

4742

LINK-BELT COMPANY

Leading Manufacturers of Positive Power Transmitting Equipment

Indianapolis, Dodge Works, 519 N. Holmes Ave.; Ewart Works, 220 S. Belmont Ave.
Chicago Works, 300 W. Pershing Rd.; Caldwell-Moore Plant, 2410 W. 18th St.
Philadelphia Works, 2045 W. Hunting Park Ave. San Francisco Works, 400 Paul Ave.
Offices in All Principal Cities
In Canada: Link-Belt Limited—Toronto Works; Montreal, Vancouver

LINK-BELT
SILENT CHAIN DRIVES

LINK-BELT POSITIVE DRIVES INCLUDE—

- Silent Chain Drives
- Silverlink Roller Chain
- P. I. V. Gear (Positive, Infinitely Variable Speed Transmission)
- Worm Gear Speed Reducers
- Herringbone Gear Speed Reducers
- Chain Drives of all types (Malleable Iron, Promal or Steel)
- Herringbone Gears
- Flexible Couplings

See Our Exhibit at A Century of Progress, Chicago, June 1 to Nov. 1, 1933

ALKALI HOLDS NO TERRORS
for Pontamine Brown N3G

Of good fastness to alkali, this dyestuff develops full strength even if thrown into the beater dry.

DU PONT DYESTUFFS
REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INCORPORATED
Organic Chemicals Department
Dyestuffs Division, Wilmington, Delaware
SALES OFFICES: Boston, Mass., Charlotte, N. C., Chicago, Ill., New York, N. Y., Philadelphia, Pa., Providence, R. I., and San Francisco, Calif. Represented in Canada by Canadian Industries, Limited, Dyestuffs Division, Beaver Hall Building, Montreal, 372 Bay Street, Toronto, Ontario.

PONTAMINE BROWN N3G possesses good fastness to light and alkali. It is also very soluble and develops full strength even if it is put dry into the beater.

This du Pont color is suitable as a base for brown shades, on all grades of paper where fastness to light and alkali is extremely important.

Write for samples of Pontamine Brown N3G today. Tests in your own beaters will bear out the wisdom of adding this color to your list. And remember—we are always ready to help you with any dyestuffs difficulties you may be having.

THE PAPER INDUSTRY

MAY, 1933
Vol. XV—No. 2

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

LEADING ARTICLES

Kraft Waste Heat Boilers.....*L. F. Bunde* 75
Value of Tension in Belt Drives.....*J. N. Smith* 79
Bed Plate Geometry.....*H. D. Cook* 80
First Paper Made by Electricity in 1896..... 81
A Lottery Financed Early Tennessee Paper Mill.....*Douglas C. McMurtrie* 81
Proper Couplings.....*Francis A. Westbrook, M. E.* 82
Pacific Coast Pulp Mill.....*D. L. Shirley* 84
Paper Representatives Join in Forestry Meeting..... 86
The Paper Foundation..... 89
National Paperboard Association Submits Plan to President..... 95

REGULAR DEPARTMENTS

Editorials 63-64
Current Thought..... 66
New Publications..... 92
Power 93
Opportunity Section..... 96
Safety Contest Scores..... 99
Technical Developments..... 101
Commercial Outlook..... 105
Domestic Raw Materials..... 106
Imports and Exports..... 107
Advertisers' Classified Index.. 109
Index to Advertisers..... 113

EDWARD B. FRITZ, Publisher

A. SCOTT DOWD, Editorial Director

HARRY E. WESTON, Editor

PUBLICATION OFFICE
333 N. Michigan Ave., Chicago
Telephone: Dearborn 8877

Eastern Office
New York, N. Y.
18 East 41st Street
Lexington 2-0357

Pacific Coast Office
Los Angeles, Calif.
1031 S. Broadway
Westmore 8501

Entered as second-class matter at the Post Office at Chicago, Illinois, February 13, 1930, under the Act of March 3, 1879. Subscription in the United States, Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico, $2.00 per year. Canada, $2.50 per year. Other countries, $3.00 per year.

Copyrighted 1933 by Edward B. Fritz, Publisher

Every Board Mill Wants Better Finish

KENWOOD BOARD FELTS will give you better finish without sacrifice of life or water removal.

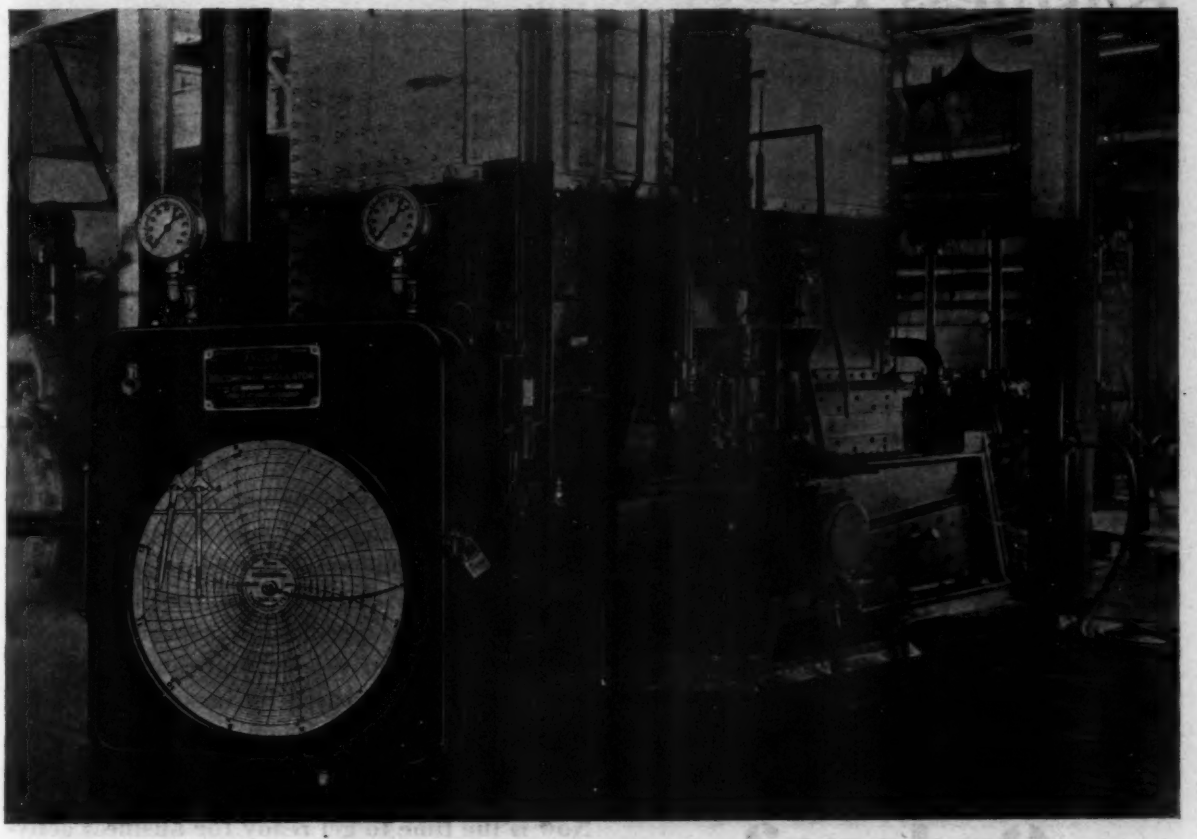
Ask the KENWOOD representative to recommend the best combination of wets and presses to meet your individual requirements.

KENWOOD WOOL PRODUCTS

KENWOOD tanned FELTS

F. C. HUYCK & SONS
KENWOOD MILLS, ALBANY, N. Y.
KENWOOD MILLS LTD., ARNPRIOR, ONTARIO, CANADA
Manufacturers of Paper Maker's Felts Since 1870

ADD to the LIFE of your STONES



Cut stone and power costs per ton of pulp with new Taylor Grinder Temperature Control. For magazine, semi-magazine and pocket types

ONE mill operator used to reburr his stones every 11 hours. He installed Taylor Control of Grinder temperatures and now operates 26 hours without reburring.

Here is the way to cut stone costs ... to protect your stones from rapid expansion and contraction and blistering following quick variations in temperature. Taylor control automatically regulates grinder temperatures closely. Its effects on the uniformity, quality and economy of production are immediate. It eliminates hot and cold grinding. It enables the operator to produce stock that is uniform in color and freeness with maximum fiber strength and felting characteristics. It helps to grind the maximum tonnage of pulp with the minimum amount of power. Here is economy for you and a higher quality stock that commands the best prices.

This Taylor Grinder Temperature Control has proved its value in American and Canadian mills—on magazine, semi-magazine and pocket type grinders. In Canada alone there are 50 in operation saving money for mill owners.

Every mill should know the details of this proved Temperature Control. For your information, address Taylor Instrument Companies, Rochester, New York, or Taylor Instrument Companies of Canada, Ltd., Toronto, Canada.

*Tycos Taylor® TEMPERATURE and PRESSURE INSTRUMENTS

*The name Taylor now identifies our complete line of products including Tycos instruments.

INDICATING · RECORDING · CONTROLLING

Business Rehabilitation Is at Work!

THE BUSINESS OUTLOOK

On March 13th letters were sent by the Strathmore Paper Company to a number of people in different parts of the country asking opinions on the business outlook. The list included paper manufacturers, merchants and converters, bankers and other business men in various lines of industry and commerce.

The replies have been classified as follows:

Geographical Location	Replies Received to date	Enthusiastic	Business Optimistic	Outlook Hopeful	Pessimistic	Recovery Rapid	Recovery Gradual
East	86	16%	69%	12%	3%	14%	86%
Midwest	62	18%	64%	8%	10%	10%	90%
South	23	5%	70%	25%	0	21%	79%
Mountain States and Pacific Coast	9	11%	55%	11%	23%	0	100%
	180	15%	67%	12%	6%	14%	86%

Will Your Mill Be Properly Equipped for Increased Orders?

There is little chance for enjoying satisfactory net profits on increased business when your operating equipment is not in proper order. For with high production costs, frequent breakdowns, dirt, low production capacities and a high percentage of rejects, you cannot hope to profit through increased business with the use of equipment that needs constant attention, frequent repairs, and a high cost of maintenance.

Now is the time to get ready for business activity. We are ready to show you how important economies can be effected through modernization or replacement of your beaters, screens, and jordans . . . improvements that will allow you to enjoy a higher percentage of net profits on present or increased production.

A Jones Engineer, right in your territory, will gladly confer with you.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of High-Grade Machinery for Paper Mills

We ARE on the Way to Prosperity

YES, we have it!

We are in the midst of "reflation."

By that, we mean that a general re-valuation of equities and commodities is in process.

We are through with deflation—"reflation" is the order of the day, and after "reflation" is accomplished (by which we mean the bringing of the value of equities and commodities up to the price level of 1926 and 1927), then inflation may take place.

Inflation was the ignition spark used by the present administration to turn the entire sentiment of the business men of the country from loss and stagnation into profit and activity.

Actual inflation is a long time ahead.

The most reassuring change in business conditions took place during the month of April. There is no gainsaying when a nation-wide industry like the steel industry practically doubles its operations in the space of thirty days, that therein lies a substantial contribution to "reflation."

Likewise, no sophistry nor any bunch of doubting Thomases can minimize the substantial contribution to "reflation" which the advance in basic commodities like corn, wheat, rye, oats and barley, is bringing to forty per cent of the producers of this country. In Chicago, wheat has advanced from a low of forty-three cents a bushel to seventy-five cents. Corn, which was selling in western Iowa and eastern Nebraska at the beggarly price of eight to ten cents a bushel forty days ago, is now bringing forty cents a bushel cash to the farmers. On April 1, there were 1,700,000,000 bushels of corn on the farms in the United States, according to government reports.

Not in the last four years have we seen such extraordinary expansion in business as has occurred in the last forty days. It is now apparent that almost every kind and class of merchandise and raw material supplies have been permitted to dwindle to an abnormally low basis.

In all divisions of industry, the buyers have ruled the market. They have been restricting their purchases to absolutely needed requirements. The fact of the matter is that we have suffered from a buyers market for the last four and one-half years. A buyers market is the ear-mark of depression. History shows that the ear-mark of every prosperous era we have ever known is the sellers market—a market in which the producer tells the buyer what he will pay for his merchandise.

The United States is at this moment making a transition from a buyers market to a sellers market —from a depression era to a prosperous era.

Up to the first of April, it was manifest that the manufacturers of commodities were reluctant to buy future orders of raw materials even to fill the orders which they had on their books.

Now, May first, there is a veritable stampede among them to avoid losses threatened by the rapidly rising prices.

Producers and sellers of commodities have endured the suffering up to April first, but now the buyer must begin to pay—he must return to the seller the losses which he has formerly taken from the suffering seller.

"Reflation" is here—and will stay.

America is not broke. It was dormant. It is now mightily aroused.

We *are* on the road to prosperity.

+ EDITORIAL +

ONE HUNDRED YEARS of Progress

DURING the past century, man has demonstrated his ability to discover the forces of science and harness them for his own use.

The century just closing stands apart from other epochs in the history of the earth. It has brought to man scientific discoveries that have delivered him from bondage, and provided a comfortable and profitable existence in a world of increasing beauty.

To commemorate this hundred years of progress in scientific research and industrial development, all nations will unite during the next few months in what may be considered the greatest achievement in engineering and pageantry to be recorded in the annals of history. Here, on the shore of Lake Michigan in the City of Chicago, the industries and sciences that have compelled the progress of the people of the earth during the past hundred years will dramatize these achievements in A CENTURY OF PROGRESS. By actual performance and in scenic story, this spectacular exposition will vividly present to the people of today the application of the fundamental principles of the sciences, crafts and arts which have emancipated man from darkness, ignorance, fruitless toil and discomfort into a new era of light, beauty, convenience, knowledge and power.

This exhibition will prove of untold educational value to the people of today. They will gain knowledge of many things affecting their existence that hitherto have not been fully understood.

The consideration of one fact alone gives an example of the tremendous progress that has been made during the last half of the century. It is stated that the amount of electricity which will be used to illuminate the Hall of Science at A CENTURY OF PROGRESS will equal the total amount of power used for lighting purposes at the World's Columbian Exposition held in Chicago forty years ago.

This, the greatest exposition of all time, is practically completed and will be opened May 27 by President Roosevelt. The rays of the star Arcturus, which have not reached the earth for forty years, will re-appear at the time of the opening of the exposition. Whenever atmospheric conditions will permit, its rays will be captured to furnish the spark that will control the electrical display of the grounds.

As one century is acclaimed, a new scientific age will be ushered in, and the makers of the next hundred years of the earth's history will find the way easier than did those who trod the paths of genius during the past century.

The paper industry, the products of which have become universal necessities, points with pride to its accomplishments during the past hundred years.

The manufacture of machine-made paper had its beginning in the United States just a little over a hundred years ago. Most of the mills at the time and for some time afterward produced paper by hand. By 1833, the one and only manufacturer of fourdriniers in the United States at the time had made three machines. The other machines then in use in the country had been imported.

These early machines, when compared with modern papermaking machines, were not only small in size and slow operating, but were also of crude design. They were, however, a marvelous advance, at least from the standpoint of productive capacity, over the hand method of fabrication.

The production of paper by machine opened up an entirely new era for the industry. The decrease in cost of production, which necessarily followed, developed a greater demand for paper.

Constant search for raw materials that would permit the manufacture of even cheaper papers than were being manufactured at the time led to the development of the wood pulp industry. Courage and resourcefulness were attributes required by these pulp mill pioneers. Papermakers were not receptive to the use of wood pulp fibers in paper production, and users of paper were very skeptical as to its suitability for use in paper that they were consuming. Prejudice was hard to overcome, but within half a century the wood pulp industry has revolutionized the papermaking industry and has played a most important part in the development of the rayon industry.

The most important use for paper a century ago was probably for cultural purposes—for printing and writing. The present extensive mechanical uses for paper had not developed. This development has come since the promotion of the wood pulp industry and much of it within the last quarter of a century.

How far reaching these developments have been upon the growth of our country, would be difficult to conjecture, but it is safe to say that modern business would not have been possible without them.

Can any one prophesy what progress will be made by the industry during the next hundred years? Is it too much to surmise that the progress may be even greater than during the past century?

MAKE THESE TESTS

Compare the Dayton Cog-Belt with any other V-Belt in vital principles of construction

First, mark two points four or five inches apart on the outer surface of a belt. Then bend the belt *double*. And while doubled, measure the distance between the marks again. Note how far the outer section of the belt has stretched. This shows how the outer section of any belt must stretch when going around a pulley.

The Dayton Cog-Belt is the only V-Belt built to take this "stretch" without strain or distortion. The outer section is made of bias-cut fabric—it "gives" without strain; like pulling your handkerchief from diagonally opposite corners.

Also, while the belt is flexed, note how the cogged inner surface has compressed—how the cogs have closed and "taken-up" the compression on the inner surface of the belt.

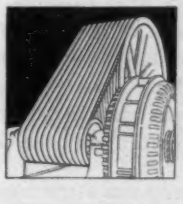
Second, compress a section of a Dayton Cog-Belt between the thumb and forefinger and note the extreme crosswise rigidity. Because of this positive crosswise rigidity there can be no "squashing" in the pulley groove . . . no distortion or twisting.

No other V-Belt combines such extreme flexibility with such positive crosswise rigidity.

And because Dayton Cog-Belts offer these exclusive advantages—because they are *built to bend*—because they have such positive crosswise rigidity—they provide maximum contact arc, have greater gripping power, permit smaller pulleys with closer centers, save floor space, run cooler, require less tension, are easier on bearings, last longer.

But don't stop with making these tests. Let us give you more of the facts—facts that prove how Dayton Cog-Belts are more efficient and, at the same time, how they save you money in many ways. Your inquiries are invited.

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO
Factory Distributors in Principal Cities and all Westinghouse Electric and Manufacturing Company Sales Offices



Dayton
COG·BELT DRIVES

CURRENT THOUGHT

The World in Washington

By WILLIAM SIBLEY

PERHAPS the truth of President Roosevelt's statement that: "A lot can happen in a week" makes comment regarding the recent conferences in Washington both needless and dangerous. Needless, because much of what transpires at these conferences will have become known presently; and dangerous, because the rapid fluctuation of events may nullify some of the points of this comment. As this is written, however, the world is in Washington, and momentous issues are at stake.

The world is in Washington largely because it hasn't any other place to go. It is there also because America is today the world's greatest sounding board. We offer the best facilities for publicity—for the press-agenting of the coming economic conference in London. The world is here to save that conference, it being well understood that on the conclusions reached in these preliminary discussions will rest the plan of action taken at London.

Not the least interesting angle to the Washington conferences, is the fact that whereas the original intention of Mr. Roosevelt was to have merely four guests at his White House party, that number grew, first to eleven, then to fifty-three. The clamor for invitations by outside nations capably reveals the sensitivities and jealousies of nations at large, and how their present-day terror and confusion brings them together, while it makes for dissention and divorce.

In the face of the dangers of prophecy, there probably will result from these Washington conferences some new national policies regarding international affairs, which will be decidedly foreign to those which have been in force for twelve years. We shall likely see growing out of these international discussions a policy of downward tariff revision, an attempt to establish a world money standard, and a radical revision of the existing war debts.

Secretary of State Hull has never considered the present world paralysis from anything but the economic angle. He seems convinced that our tariff walls, our economic nationalism and our attitude of isolationism are the fundamental causes of the three-year depression. He believes that political unrest would disappear with the solution of, to him, the deeper economic problems.

President Roosevelt is wont to place the currency problem first. He feels that the present tariff restrictions, which have been reduced to the point of absurdity by depreciated foreign currencies, are of secondary consideration to that of the necessity for an international money standard. Both of which beliefs point directly to the drastic reduction of our present tariff wall, which will mean, even for our own industry, a mixed blessing. While such a reduction will benefit perhaps fifty per cent of our mills, that same reduction will impose a heavy and almost unbearable burden on the other half.

Doubtless even before this comment has reached you, the President will have asked Congress for a grant of authority to deal individually with the problem of war debts. This, of course, means further revision of the war debts—and whoever heard of the war debts being revised upward? Such a grant to the President means the further loss of billions of indebtedness for this country, but the President's view seems to be that world bankruptcy has reached a stage where these billions hardly matter. He feels that by treating each debt individually with the respective debtor nations he can gain concessions in trade or disarmament which collectively will return to the United States an economic saving equal to the receipt of debt payments—in the event of such payments. He realizes that if present armament expenditures were cut in half there would, in one year, be saved enough to pay fifty per cent of the war debts.

As at present outlined, the forthcoming World Economic and Monetary Conference will be opened by King George in the Geological Museum, London, on June 12. This promises to be the greatest international conference since Versailles—a promise greatly bolstered by the present Washington talks. At this conference we shall probably propose a tariff truce, drastic disarmament, plus some plan for an international money standard.

What if this conference fails? What if no government is willing to grant concessions? What if the United States becomes unwilling to pay the price it finds necessary to participate in world reorganization? Could we not rebuild and reform our own economic structure within our own borders?

After all, ninety per cent of our markets and the broad base for our lasting prosperity are here, within our forty-eight states. Not as easily, perhaps, nor on so high a scale as in the good old days; but on a level far higher than can be found anywhere else, we can still sustain ourselves. We can live quite independently, if we must, and in so doing contribute an incalculable lift to world economic conditions. In the final analysis, the world need not be in Washington, in London or any other single place. To work with the co-operation of the world would be infinitely easier, but we *can* work alone. Regardless of the way the tide turns, the immediate future is brighter than it has been for several years.

DODGE HAS SERVED THE PAPER INDUSTRY FOR FIFTY YEARS

Power transmission engineering has been the exclusive business of the Dodge Manufacturing Corporation for over fifty years. Many Dodge drives operating satisfactorily today have service records of thirty years and more.

●

Dodge engineering has kept pace with changing conditions in the industry and today modern Hypoid drives and Dodge-Timken Bearings, backed by long experience and specialized knowledge, are being accepted without question by an industry familiar with the quality and performance that is guaranteed by the Dodge nameplate.

●

Profitable paper making demands a dependable power supply, economically delivered. Drives and bearings engineered for the job by engineers who specialize on this one phase of engineering, is the best insurance of continuous, trouble-free and low cost operation.

●

Why not ask Dodge to survey your power drive and bearing requirements and submit recommendations for profitable modernization? Dodge Manufacturing Corporation, Mishawaka, Indiana.

REG. U.S. PAT. OFF.

DODGE

MISHAWAKA

Since 1634 People Have Been Coming to Green Bay

June 8, 9 and 10, 1933

The National Convention of Pulp and Paper Mill Superintendents

will come to this grand old city

4 GOOD REASONS

why every Superintendent should come this year:

1. A Program built for this day and hour.

Features: New and Future Uses for Paper; Zinc Pigments; Chromium in the Paper Industry; Getting the Jump on Maintenance Expense; Demonstration of White Water Utilization; The Windowless Mill; Tension Regulation; Developments in the Industry; The Control of Man-Failure.

2. Side Trips of Unusual Importance:

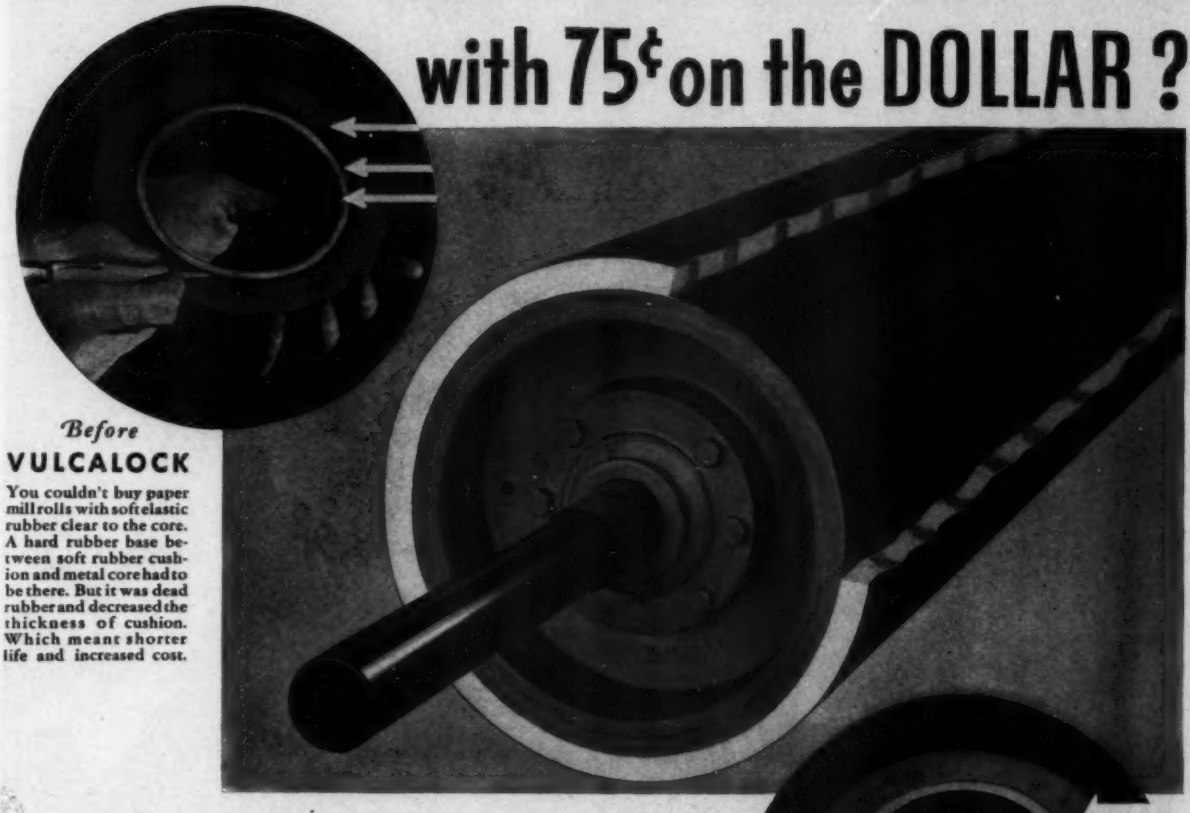
Paper Exhibit at the Chicago Centennial; Open House at The Paper Institute, Appleton; A Score of Modern Mills saying "Welcome!"

3. Railroad Fares are low this year.

4. A novel re-union on the grounds of Wisconsin's Premier Golf Course June 7th, a day early.

AND If Friend Wife can make her vacation fit the date, the "Sister Back-tenders" of Green Bay will give her a wonderful outing.

WOULD YOU BE SATISFIED with 75¢ on the DOLLAR?



Before
VULCALOCK

You couldn't buy paper mill rolls with soft elastic rubber clear to the core. A hard rubber base between soft rubber cushion and metal core had to be there. But it was dead rubber and decreased the thickness of cushion. Which meant shorter life and increased cost.

● You wouldn't accept Paper Mill Rolls, even from Goodrich, if they were only three-quarters covered! *Nobody* would if the other quarter were stripped out of the roll surface. But *anybody* who accepts the old-fashioned hard rubber base roll, nowadays, is doing just that.

Suppose you wanted a roll with a cover one inch thick, but one-fourth of it was hard rubber base, which represents so much dead rubber cushion-waste. That means you would get a seventy-five cent value for every dollar that you invested.

Canny buyers in today's market are not satisfied with 75c on the dollar; they expect a full dollar's worth of value in the product. Just as you do! *Why* Vulcalock Paper Mill Rolls give you the most for your money should interest you. Write for the facts... The B. F. Goodrich Rubber Co., Mechanical Rubber Goods Division, Akron, O.

ROLL COVERINGS—HOSE—BELTING—MISCELLANEOUS RUBBER PRODUCTS

After
VULCALOCK

Through the bonding of soft elastic rubber directly and inseparably with metal core, Vulcalock increased the thickness of cushion and eliminated the hard rubber base which had no cushioning properties. This means longer life to the roll and decreased cost.

Goodrich

ALL *good things* IN RUBBER

Vulcalock *Paper Mill Rolls*

"HAMILTON FELTS — we use them almost exclusively. They're uniform — with plenty of water shed to make the going on the coal pile easy. But how Shuler & Benninghofen get that uniformity in felt after felt, year after year, is something I don't know. Although, I imagine the trick is experience and lots of it."

Hamilton Felts

SHULER & BENNINGHOFEN, Hamilton, Ohio

Miami Woolen Mills, Established 1858

6 GOOD REASONS

THERE are others, but here are six outstanding reasons for the proved success of Aloxite Brand Pulp Grinding Wheels—

1 The abrasive is a specially produced aluminous oxide, trade named "Aloxite"—hard, sharp, tough; properly formed grain to insure speed of cut and correct grinding action.

2 Uniformity of Structure—no "hard and soft spots"—a structure uniform throughout every inch of every segment.

3 Duplication of Wheel Performance—suitable gradings can be duplicated in wheel after wheel insuring constant production of uniformly high quality pulp.

4 Long Life—High Production

5 Less Burring—the burring intervals on these wheels often from 48 to 72 hours—80 hour intervals not uncommon—resulting in sustained high quality pulp.

6 Thin Joints between Segments—this form of construction plus wheel design permits maximum volume of usable abrasive and the joints wear down with the segments—no undercutting.

All Resulting in Greater Production of High Quality Pulp with the ALOXITE BRAND REG. U. S. PAT. OFF.

PULP GRINDING WHEELS

THE CARBORUNDUM COMPANY • NIAGARA FALLS, N. Y.
REG. U. S. PAT. OFF.

CANADIAN CARBORUNDUM CO., LTD., NIAGARA FALLS, ONT.

Sales Offices and Warehouses in New York • Chicago • Boston • Philadelphia • Cleveland Detroit • Cincinnati • Pittsburgh • Milwaukee • Grand Rapids • Toronto, Ont.

(CARBORUNDUM AND ALOXITE ARE REGISTERED TRADE MARKS OF THE CARBORUNDUM COMPANY)

$500
REWARD

will be paid to
the person
supplying me
or the local
police, with the
first information
leading to a
successful prosecution
of any person or firm
manufacturing paper outside
the Irish Free State, bearing
the watermarked words

"GUARANTEED IRISH MADE BY SWIFT BROOK PAPER MILLS LTD."

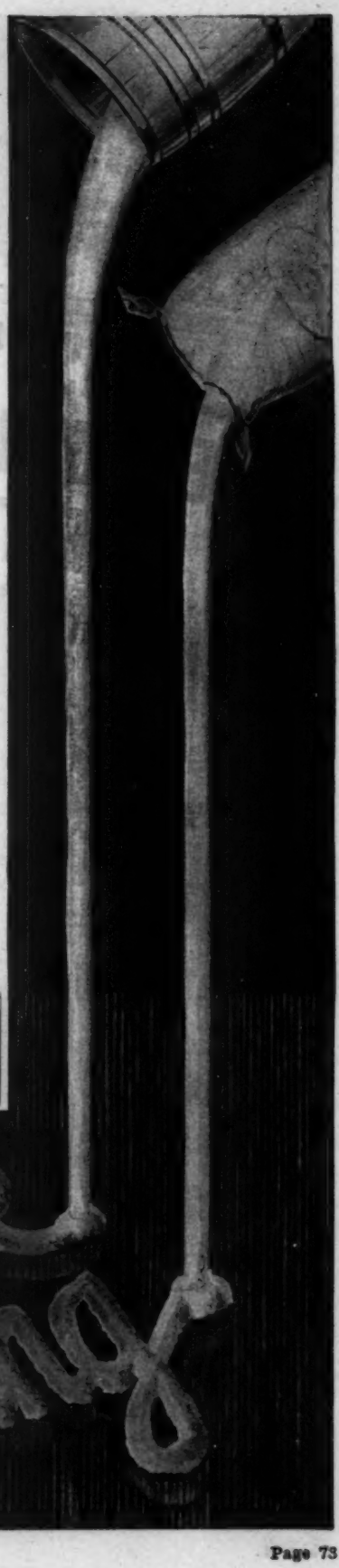
or

"GUARANTEED IRISH PAPER MADE IN SAGGART, IRELAND."

Philip O'Reilly,
Solicitor,
19 St. Andrew Street,
Dublin, I. F. S.

GRASSELLI TRI-SODIUM PHOSPHATE

as a cleansing agent



Insures Safety...Economy...Efficiency

A mild alkaline salt for cleaning of felt and all general cleaning purposes. A trial will convince you of its merits.

Other Grasselli Chemicals for Paper Manufacturers

Acetate of Lead	C. P. Ammonium Hydroxide
Aluminum Sulphate, Commercial	C. P. Hydrochloric Acid
Aluminum Sulphate, Iron Free	C. P. Nitric Acid
Aqua Ammonia	C. P. Sulphuric Acid
Barium Carbonate	Muriatic Acid
Barium Chloride	Salt Cake
Barium Sulphate (Blanc Fixe)	Silicate of Soda
Bleach	Soda Ash
Caustic Soda	Sulphuric Acid

Our Research Department may be of help in solving some of your problems. This service is available to you. *Write, wire or phone our nearest branch below.*

THE GRASSELLI CHEMICAL COMPANY, INC., Cleveland, Ohio

New York and Export Office: 350 Fifth Avenue

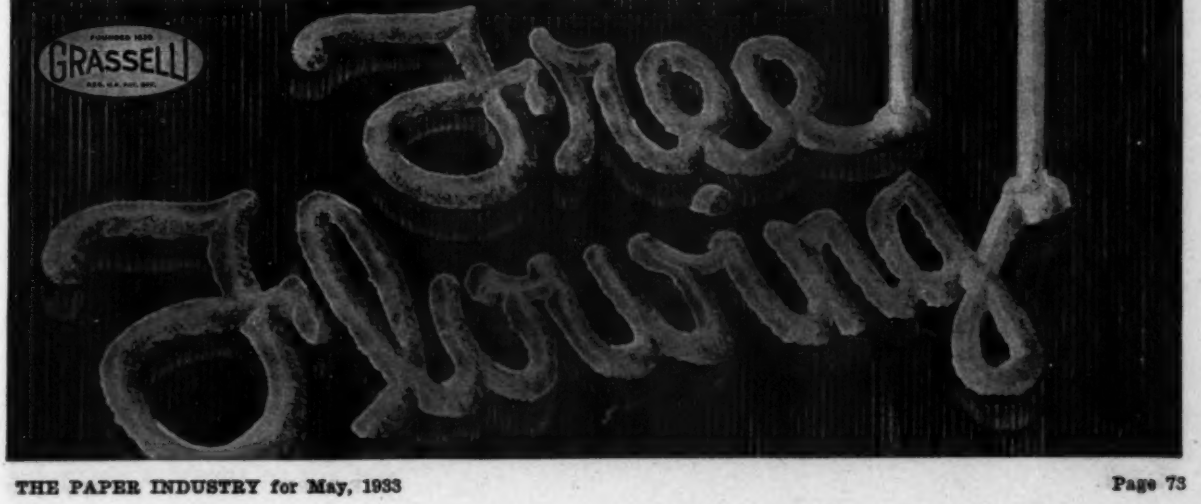
Birmingham	Chicago	Milwaukee	Philadelphia	St. Louis
Boston	Cincinnati	New Haven	Pittsburgh	St. Paul
Charlotte	Detroit	New Orleans	Rensselaer, N.Y.	

SAN FRANCISCO—584 Mission St. LOS ANGELES—2260 E. 15th St.

Represented in Canada by CANADIAN INDUSTRIES, LTD.
Acids and General Chemicals Division—Montreal and Toronto

GRASSELLI GRADE

A Standard Held High for 94 Years



NEWS!!
EXTRA
J.O.ROSS ENGINEERING CORPORATION
EXCLUSIVE SALES REPRESENTATIVE FOR
"DELTHIRNA" SYSTEM
ANNOUNCING
The appointment of the J. O. Ross Engineering Corporation as exclusive United States representative in charge of sales for the internationally known DELTHIRNA Sizing System.
Combining the proven construction and operating advantages of the DELTHIRNA System with the specialized facilities of the Ross organization, now presents service for the paper industry that is unique, complete and comprehensive. DELTHIRNA—the outstanding sizing plant equipment introduced by Ross.
Mill managers seeking savings of 30% and more in their sizing costs may now secure complete details of the DELTHIRNA System and recommendations for their particular requirements by getting in touch with the nearest Ross office.
J. O. ROSS ENGINEERING CORPORATION
101 North Wells Street
CHICAGO
Main Office—122 E. 42nd Street
NEW YORK
600 North Front Street
PORTLAND, ORE.

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Kraft Waste Heat Boilers

.....Their Value as Steam Generators

By L. F. BUNDE, Engineer
Wisconsin Rapids, Wisconsin

THE problem of utilizing the heat liberated in the combustion of the wood substance in kraft black liquor is probably as old as this process itself. At first, the heat was used to reduce the salt cake and to concentrate only partially the liquor with inefficient, direct contact evaporators. High temperature beyond the smelter were avoided as much as possible and the combustion gases were heavily diluted with air to reduce these temperatures and, likewise, refractory maintenance. The rotary incinerator for completing the concentration of the black liquor was then a necessary part of the equipment, and, although very generally used today, has been omitted in systems that have been developed in the last eight or ten years. The excess heat absorbing equipment invariably consisted of a boiler which, due to operating difficulties, was of simple design and insufficient heating surface.

Heat Value of Black Liquor

Unfortunately, only meager and inconsistent information is available on the nature of black liquor as a fuel. Personal opinion, rather than fact, seemingly is the basis of such information as there is on the subject. One authority has assumed that 17,000,000 B. T. U. per ton of air-dry pulp is the maximum calorific value of moisture free liquor under best conditions. A southern board mill estimates 18,000,000 B. T. U., while a figure of 27,000,000 B. T. U. is given for a Swedish mill that is cooking for high bleachability. Such wide differences affect the recoverable heat tremendously, because process losses (being independent of the heat of combustion) are fairly uniform and do not vary proportionately.

There are, of course, a number of factors that affect the calorific value of the liquor. Among these factors are: wood species, age of wood, pulp yield, bleachability of pulp, and washing losses.

Several determinations must be made to find the exact fuel value of black liquor for any particular combination of woods and cooking cycles. The quantity of liquor pumped to the recovery room and its average per cent of moisture free solids must be determined, as must the true calorific value of these solids.

Determination of quantity may be made by tank measurements, or with a carefully calibrated standard type displacement meter. Such measurements, to insure accuracy, should be obtained over a period of a month or more and should be checked against pulp production. In addition, a composite and representative sample of the liquor should be taken over the test period to permit the calculation of the average per cent of moisture.

Results of calorific determination made on samples of the same liquor by several nationally known laboratories varied so widely as to make them practically useless. Apparently, the principal cause of inaccuracy in such determinations is in the drying of the sample, since black liquor is quite unstable. Decomposition of the liquor and subsequent loss of fuel value take place at fairly low temperatures. Surely, a definite procedure for testing the liquor should be developed.

The following method for handling the sample is offered as a suggestion, since through its use the volatile loss is kept at a minimum. Place an evaporating dish containing a weighed sample of liquor in a standard laboratory desiccator over calcium chloride and maintain a temperature never in excess of 100 deg. Fahr. After about two days in the desiccator the film formed on the surface of the sample seals and prevents further evaporation. Break this seal by stirring the liquor and continue to stir at intervals of three or four hours until the sample ceases to lose weight. Then place the material, which now takes up moisture from the air and becomes sticky in a few moments, in a mortar and finely pulverize it as quickly as possible. Return the pulver-

ized sample to the desiccator and continue drying for about two more days, or until the sample ceases to lose weight. It is then ready for calorific determination.

Losses in Burning Kraft Liquor

Moisture losses and losses due to chemical reduction and the high ash content of the fuel are the major losses with which to contend in the kraft process of recovering alkalis. The necessary evaporation of the moisture from the liquor constitutes by far the greatest loss of the process. It consists primarily of the heat of evaporation plus the sensible heat in both the liquid and vapor form; that is, the liquor temperature to the unit, and the vapor temperature as exhausted from the system. Concentration of the liquor, therefore, should be accomplished in the most efficient manner possible through multiple effect evaporation and the utilization of waste heat gases.

The unavoidable chemical losses are the heat of reduction of salt cake (Na_2SO_4), and the heat of fusion of the soda salts in the smelter. Several authorities have fixed the heat of reduction of salt cake at 3,000 B. T. U. per pound, while the heat of fusion of the soda salts in the smelter amounts to approximately 60 B. T. U. per pound of total chemical including salt cake. Other losses which make up the heat to the dissolving tank are the sensible heat in the chemical up to the fusion temperature of approximately 1580 deg. Fahr. and from this temperature to approximately 2200 deg. Fahr. in the molten state. These losses total from 8 to 12 per cent of the heat available in the liquor.

Radiation is an unavoidable loss which will be high in some kraft waste heat units as it includes that from the dissolving tank. Other losses which might be termed unaccounted for are gases and vapors from the smelt spout and dissolving tank, combustible in the smelt, and combustible carried up the stack. In any heat balance set up for this type of unit, liberal allowance should be made for such losses.

Present Kraft Recovery Systems

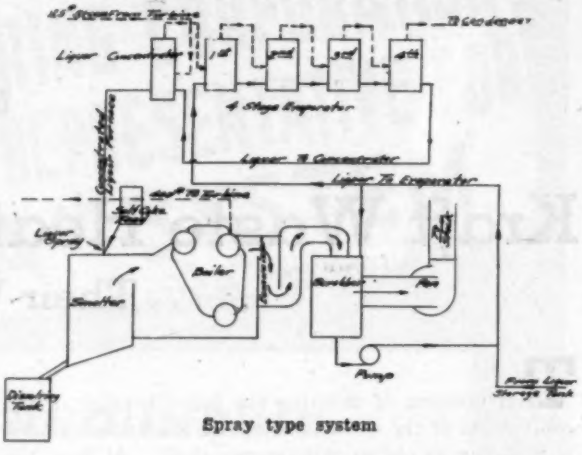
Three systems, each of which involves the use of waste heat boilers, are now in commercial use for the burning of kraft black liquor. They may be designated as the spray type, dry powder, and the rotary and disc evaporator systems.

In the spray type system, the liquor is concentrated in multiple effect evaporations and then introduced directly into the smelter without any preliminary drying by contact with flue gases. The boiler is placed almost directly over the smelter with its tubes partly exposed to the radiant heat of the fuel bed. Essential equipment to such a system includes a smelter, boiler, economizer, and scrubber. This system is now quite extensively used, the only important variations being in the arrangement of sprays and in the capacity of the units.

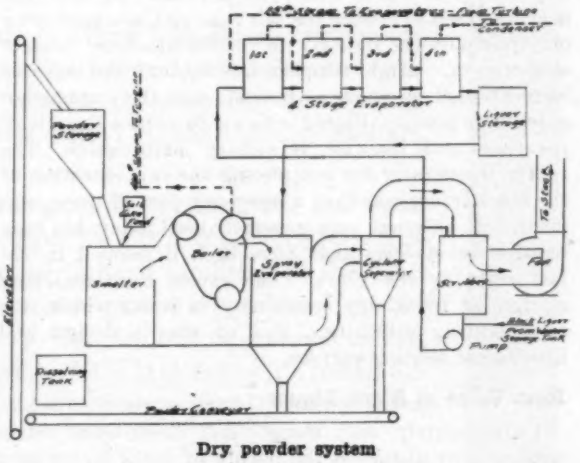
In the second system, liquor, that is finely broken up and dried in a spray chamber by the exit gases from the boiler, is fed into the smelter in dry powder form. This system is of quite recent development and is now operating in a mill in Wisconsin. A smelter, boiler, spray chamber, and scrubber constitute its essential equipment.

The rotary and disc evaporator system, commonly known as the Swedish system, is most widely used and is probably as old as the kraft process itself. In the early days of the sulphate process some mills reclaimed part of the surplus heat by placing a boiler between the rotary incinerator and the disc evaporator. Such a boiler generally had a limited heating surface, and generated from 2,000 to 5,000 pounds of steam per ton of pulp. In addition to the boiler, the system comprised in the main a smelter, rotary incinerator, economizer, and disc evaporator.

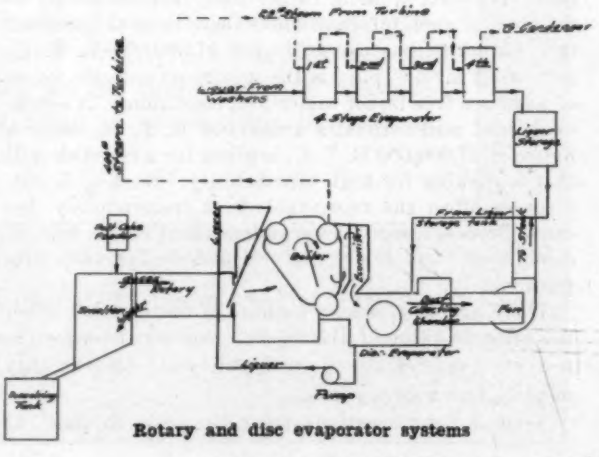
The economizer, although no evidence seems available



Spray type system



Dry powder system



Rotary and disc evaporator systems

as to its use, was added as essential equipment to both the spray type and Swedish systems. Its use has a very practical application, and must be considered if the maximum in heat recovery is obtained.

Theoretical Comparisons of the Three Systems

A true concept of the theoretical possibilities of each system can only be obtained by actual comparison under strictly analagous conditions insofar as liquor, temperatures, CO_2, etc., are concerned. The accompanying tables, with all figures based on the liquor resulting from one ton of dry pulp production, show the distribution of heat and the electric power in kw-hr. that could be generated on a non-condensing cycle from boiler pressure to that necessary to operate the multiple effect evaporators. The basic figures underlying the entire comparison include the net steam and power delivered to the mill after deducting the steam and power required to produce it.

The following fuel analysis was used for computing gas volumes, temperatures, and other losses:

	Per Cent
Carbon	38.2
Hydrogen	1.6
Sulphur	2.9
Water of Combination	14.2
Chemicals (Na_2SO_4, Na_2S, Na_2CO_3, & NaOH)	43.1
	100.0

Results of the calculations of net steam for mill use for each system show little variation from one another. The pounds of steam equivalent per ton of production may appear high to the pulp mill man, but it is believed that with proper distribution of the heating surface and careful operation that results approaching these figures could be obtained.

The temperatures and liquor conditions upon which the various calculations were based were taken either from actual operating experience or from performance figures supplied by manufacturers and promoters of these systems.

Theoretically, at least, no particular advantage is indicated for any one system. Should any advantages exist, they would be in first costs, chemical reduction, chemical losses and operation.

Practical Applications of Theory to Swedish System

An analysis of results obtained by four representative mills equipped with the Swedish system in waste heat recovery might be tabulated as follows:

Plant	Steam per Ton (Pounds)	Probable Total Heat per Ton (B. T. U.)	Per Cent of Heat as Steam
A	2,200	20,000,000	10.6
B	4,600	19,000,000	23.5
C	5,700	22,000,000	25.1
D	6,500	23,000,000	27.4

A careful study of the equipment used, and methods of, operation in each of the above mills disclosed the following general reasons for their poor results:

1—Insufficient boiler surface.

2—Difficult to maintain clean boiler surfaces.

3—Low concentration of liquor to unit.

4—Excessive amount of air leakage—principally at inlet to rotary.

Comparative Tabulation and Theoretical Heat Balance

General Data (Assumed)

1.	Steam presure at boiler outlet lb. ga.	400
2.	Superheat at boiler outlet lb. ° F.	200
3.	Steam pressure available for evaporators lb. ga.	25 and 125 lb.
4.	Feed water temperature ° F.	180
5.	Cooling water temperature ° F.	50
6.	Room air temperature ° F.	70
7.	Temperature of liquor to steam evaporator ° F.	165
8.	Per cent solids in liquor to steam evaporator ° F.	22
9.	B. T. U. value of dry solids per lb. (System No. 2—6350)	6500
10.	Lb. of dry solids per ton pulp production	3500
11.	CO_2 in flue gas leaving boiler, per cent	12

		System Number 1 Spray	2 Dry Powder	3 Rotary and Disc
12.	Per cent solids in liquor to scrubber or disc evaporation	62	52	55
13.	Temperature of liquor to scrubber or disc evaporation ° F.	200	180	180
14.	Per cent solids in liquor to spray, spray chamber or rotary	66	55	66
15.	Temperature of liquor to spray, spray chamber or rotary ° F.	212	200	190
16.	Flue gas temperature over smelter after addition of secondary air ° F. (calculated)	2280	2440	2400
17.	Flue gas temperature leaving rotary ° F.	....	....	1900
18.	Flue gas temperature leaving boiler ° F.	625	725	625
19.	Flue gas temperature leaving economizer ° F.	400	....	500
20.	Flue gas temperature leaving scrubber or disc	300	220	220
21.	Total evaporation in steam evap. lb.	10300	9200	9560
22.	Steam required for evaporation at 25 lb. pressure (F. & A. 212° F.)	....	3340	3470
23.	Steam required for evaporation at 125 lb. pressure (F. & A.)	4200	....	....
24.	K. W. H. in expanding steam from 400 lb. to 25 lb.	....	133	139
25.	K. W. H. in expanding steam from 400 lb. to 125 lb.	76	....	....

Theoretical Heat Balance Per Ton of Pulp Production

	Thousands of B. T. U.					
	System No. 1 Spray		System No. 2 Dry Powder		System No. 3 Rotary and Disc	
	B.T.U.	Per Cent	B.T.U.	Per Cent	B.T.U.	Per Cent
1. Heat of reduction (325 lb. NA_2SO_4 per ton)	973	4.17	973	4.23	973	4.14
2. Fusing chemicals	105	.45	105	.46	105	.45
3. Heating chemicals to fusion point	535	2.30	539	2.34	548	2.23
4. Heating molten chemicals to 2200° F.	165	.71	165	.72	165	.71
5. Evaporation in smelter	1821	7.83	105	.46	220	.93
6. Evaporation in rotary	.....	....	....	....	1760	7.48
7. Evaporation in disc evap.	.....	....	....	....	1165	4.96
8. Evaporation in spray drier	.....	....	2728	11.86	....	....
9. Evaporation in scrubber	324	1.39	351	1.53	....	....
10. Loss in flue gas to stack	1710	7.37	1204	5.22	1260	5.39
11. Loss due to hydrogen in fuel	527	2.17	505	2.19	508	2.16
12. Loss due to moisture in air (50% rel. hum.)	248	1.07	242	1.05	243	1.03
13. Loss due to CO in flue gas	100	.45	100	.43	100	.42
14. Heat in Cooling water for blow pipes, feed pipes, etc.	400	1.75	400	1.74	500	2.12
15. Radiation and unaccounted for	2780	12.00	2990	13.00	3060	13.00
16. Heat in steam from boiler	13514	58.40	12616	54.77	12888	54.88
17. Total B. T. U. in fuel plus sensible heat in liquor to unit	23202	100.00	23023	100.00	23495	100.00
18. Heat in steam to evaporate liquor	4075	....	3240	....	3370	.....
19. Net for mill use	9439	....	9376	....	9418	.....

5—Lack of means for controlling air.

6—Incomplete combustion due to poor mixing of air with gases from smelter.

By applying elements of design that have made the modern steam plant possible, together with a reasonable amount of good judgment, should permit the design of a unit that closely approaches the theoretical heat balance. In fact, a modernized Swedish system was installed as a direct outgrowth of this thought. Unfortunately, conditions did not permit the installation of all necessary equipment for maximum efficiency, but a brief description of the equipment selected may be of interest.

Boiler manufacturers with previous experience on kraft waste heat applications were consulted to aid in the selection of a boiler. Specifications under which the boiler was to operate were made known to them. Recommendations from these manufacturers, even though of much value, showed wide variations in types and sizes. In fact, the amount of heating surface suggested varied over 100 per cent. Decision finally depended entirely upon the judgment of the designer.

Operation has proven that in the selection of a boiler the type is not so important, except that the design provide a liberal slag screen to cool the gases in the first pass. This arrangement will prevent solids from being carried into the main bank of the boiler tubes in the molten state. Provision should also be made for expanding the gases as they leave the rotary. This expansion of the gases permits the dropping out of as much of the suspended solid material as possible. Such material through a hopper or conveyor should be removed from the setting and returned to the smelter or storage.

In making calculations on the effectiveness of disc evaporators, it was found that sufficient concentration of the black liquor could be accomplished if the entering gas temperatures did not exceed 500 deg. Fahr. When operating at 450-lb. boiler pressure, these gases will have the boiler at about 625 deg. Fahr. A logical location is, therefore, left for an economizer. This unit was not installed, when making the system installation, but space was alloted for it so that it might be installed at some future time if necessary. Likewise, a place was provided for a superheater of sufficient surface to produce a total steam temperature of 650 deg. Fahr. (200 deg. superheat.)

The remainder of Mr. Bunde's article will appear in a subsequent issue of this magazine.

❖ ❖ ❖

Removing Mineral Coatings from Heated Papers

In testing papers coated with clay and casein, the Bureau of Standards has found that the large amount of coating minerals present causes inaccurate values for copper number and alpha cellulose content, therefore, their removal is necessary prior to making these tests of cellulosic purity. But when the heat test for stability was applied to the papers, the heat treatment made the coating so resistant that it could not be removed satisfactorily from the paper by the usual acid-alkaline treatment.

A method devised by Sutermeister and Porter for removing resistant coatings in analysis of paper for amount of coating gave very satisfactory results. By their procedure, the heated papers are immersed in a warm, weakly alkaline solution of trypsin, an enzyme, for about two hours. After such treatment, the coating was brushed off easily and completely. The same treatment applied to uncoated paper did not affect its copper number and alpha cellulose values. A commercial preparation of enzymes used commercially for desizing cotton and degumming silk was found to be even more effective than the trypsin and it is more stable and less expensive.

Value of Tension in Belt Drives

By J. N. SMITH
E. F. Houghton & Co.

REGARDLESS of the type of drive, or the kind of belt used, the amount of power transmitted by any belt is proportionate to the tension of the belt and the coefficient of friction between the belt and the pulleys.

When a drive is not in operation, the tension on both sides of the belt is equal; that is, the total tension on the belt is divided equally between the two sides. As soon as the drive is started, the tensions change in each side. One side becomes T_1 (tight side), and the other becomes T_2 (slack side).

In any belt drive, the power transmitted is proportional to the difference between T_1 and T_2. This difference is known as the "effective tension" (ET). The amount of power any drive will transmit depends entirely upon the effective tension and the speed of the belt. To transmit a given amount of horsepower the higher the belt speed, the lower the effective tension; the lower the belt speed, the greater will be the effective tension.

When a belt has a high coefficient of friction a greater part of the total tension on the belt will do effective work. But if the coefficient of friction of the belt is low, the total tension must be increased to compensate for the low gripping power of the belt. This excessive tension causes excessive bearing pressure which results in a waste of power and rapid bearing wear. It also stretches the belt, necessitating frequent take-ups and shortens the life of the belt.

Determination of Proper Tension

To better understand the relation of tensions, definitions of the various tensions and a discussion of their relation to one another may not be amiss.

Let TT — Total Tension
ET — Effective Tension
T_1 — Tight Side Tension
T_2 — Slack Side Tension

Total Tension (TT) $= T_1 + T_2$

Effective Tension (ET) $= T_1 - T$

$$T_1 = \frac{TT + ET}{2}$$

$$T_2 = \frac{TT - ET}{2}$$

The tension ratio is the ratio of T_1 to T_2 and is governed by the total tension.

The higher the tension ratio, the less total tension you have on the belt; and the lower the tension ratio, the greater total tension. That is, as the tension ratio increases, the tension in the belt decreases. Too low a tension ratio is as inefficient as too high a ratio.

The effective tension in the belt can always be determined by the following method:

$$\frac{\text{Horsepower} \times 33{,}000}{\text{Speed of belt in feet per minute}} = \text{effective tension,}$$

or the tension in pounds required to transmit the rated horsepower.

Therefore, the effective tension on a 10 hp. drive with a belt speed of 1,650 feet per minute would be

$$ET = \frac{10 \times 33{,}000}{1{,}650} \text{ or } 200 \text{ pounds—the amount of}$$

pull necessary to transmit 10 hp. at this speed.

If the total tension on the belt is found to be 400 pounds, then the tension ratio can be found by using the formula,

$$T_1 = \frac{ET + TT}{2} \text{ or } \frac{200 + 400}{2} = 300 \text{ pounds.}$$

T_2 is, of course, TT minus T_1, or 400 — 300 = 100 pounds. With T_1 equal to 300 pounds and T_2 equal to 100 pounds, the tension ratio is one to three.

By decreasing the total tension to 300 pounds, T_1 equals 250 pounds, and T_2 equals 50 pounds, or a tension ratio of one to five. It must be borne in mind that the effective tension in either case must remain the same, as the horsepower and the speed of the drive do not change. Obviously, the *total* tension must be known in order to determine the tension ratio.

The folly of operating belts at extremely high tensions is also apparent. As the total tension on the belt is increased, the tension ratio is reduced. That is, if the total tension of the belt were increased to 600 pounds, T_1 would then be 400 and T_2 would be 200, giving a tension ratio of 2 to 1. Though this may appear to give efficient power transmission, it really does not because of the high bearing friction which it creates.

The higher the coefficient of friction of a belt, the less total tension is required. Likewise, a belt with a low coefficient of friction requires a high total tension. A belt should be operated at a normal tension, just tight enough to keep it from slipping. This practice will insure longer belt life and bearing life because of less strain. The belt which has a high coefficient of friction will pull the required load under lower tension and is the best belt in the long run.

No matter what type of short center drive is installed, if the center distance is fixed (that is, if the motor is mounted on a rigid base), the belt is subject to centrifugal force. As soon as the drive is started, the tension in the belt changes, and one side of the belt becomes slack. Because of centrifugal force, this side of the belt will be thrown away from the pulley, causing a loss of surface contact with the pulley. The results are twofold; loss in r.p.m. and slippage.

Excessive slip is often due to a change in the tension ratio. This change is caused by the normal stretch of the belt or by operating the belt at too high a tension ratio (too loose). As soon as the tension ratio changes, it is necessary to move the motor back to take up the slack and maintain the original tension.

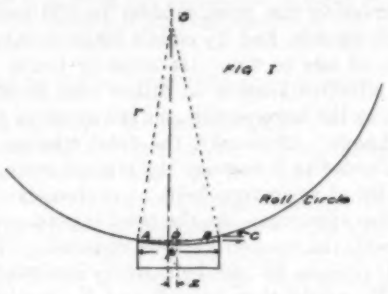
It is known that the ideal drive is one which can maintain a uniform belt tension at all times and eliminate the effects of centrifugal force.

Bed Plate Geometry

By H. D. COOK
Research Laboratory Staff, S. D. Warren Company

OBVIOUSLY it seems that the efficiency of a beater bed plate can be no greater than the fraction of its working surface in practical contact with the flybars of the roll. To be in practical contact, clearances should be in the order of magnitude of a fiber diameter or less. If cutting or abrasion is to take place by shearing action, as seems the intention of the beater design, the reason for this small clearance is obvious. Fiber structure is modified by impact of flybars against stock, and by stock being thrown by the flybars against the plate, but this is not believed to be the object of the design.

Setting a bed plate to give a uniform clearance over its entire surface with a tolerance of less than .001 inch is not reasonably possible. That is why new



plates are ground in place with sand beneath the roll. Frequently, after what seems reasonable grinding, a new plate will not function as well as a worn plate. There are often too great differences in clearness over different points on the plate surface to be evened up by reasonable grinding. Similarly, the position of the plate in a wooden cradle with respect to the roll may change under the stress of service sufficient to make great percentage differences in the working clearance. Conditions such as these offer some explanation to the irregular behavior of a beater with the same roll setting on successive furnishes.

A new plate, after grinding in a lathe to conform as nearly as possible to the diameter of the cutting edges of the flybars of its corresponding beater, should be placed in the cradle under the roll so that its axis is parallel to the roll axis both vertically and horizontally. The horizontal adjustment is made on the roll—levelling with the lighter bar. With the clearance between the flybars and plate the same at three corners of the plate, the plate is ready to grind in with sand and water.

Geometrical analysis of the situation (Figure 1) is helpful in realizing the care necessary in setting the plate of the usual hollander-type beater with the plate centered vertically beneath the roll. Let *O* denote the center of the flybar edge circle whose path is traced; *r* the radius to the flybar edge, and *OA* and *OB* the distances from the center of the flybar edge circle to the horns of the plate whose width is *p*. The plate, shown level, is offset from the center line by the distance *z*. *OD* is the vertical radius extended to the point of intersection with the line AB; and *C* is the clearance at the front of the plate.

OAD and *OBD* are two unequal right triangles, therefore

$$\overline{OB}^2 = \overline{OD}^2 + \overline{DB}^2 \text{ and}$$

$$\overline{OD}^2 = \overline{OA}^2 - \overline{AD}^2$$

or by combining equations and extracting square root

$$OB = \sqrt{\overline{OA}^2 - \overline{AD}^2 + \overline{DB}^2}$$

Then

$$C = OB - OA$$

$$C = \sqrt{\overline{OA}^2 - \overline{AD}^2 + \overline{DB}^2} - OA$$

$$OA = r$$

$$AD = \frac{p}{2} - z$$

$$DB = \frac{p}{2} + z$$

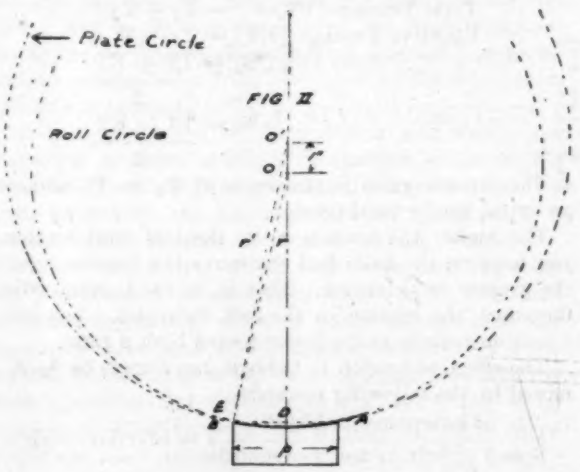
If the plate were centered properly, AD would equal AB or $\frac{p}{2}$. AD or AB are actually greater or less than $\frac{p}{2}$ by the amount of the offset z. By substitution,

$$C = \sqrt{r^2 - \left(\frac{p}{2} - z\right)^2 + \left(\frac{p}{2} + z\right)^2} - r \quad \text{or}$$

$$C = \sqrt{r^2 + 2pz} - r$$

With a 12-inch plate offset, .008 of an inch and *r* equal to 32.5 inches, the clearance will be .003 of an inch at the front of the plate with actual contact at the back—an average of .0015 of an inch of metal to be ground from the entire plate surface to equalize clearance. No millwright or engineer can set this close in a wooden cradle to operate under the working stress. Much greater clearances have been found by actual inspection.

Consider the situation in the same way when a new plate is ground in a lathe to fit the circumference of a



newly filled roll but installed under an old roll with a working diameter that has been reduced 2 inches by wear (not an unusual circumstance). The calculated clearance *EB* (Figure 2) for a perfectly centered plate that is 12 inches wide and has a 33-inch radius, with a roll that has a 32-inch radius, is .02 of an inch on the front and back edge with contact in the middle, because

$$EB = OB - r$$

$$OB = \sqrt{\overline{OD}^2 + \overline{DB}^2}$$

$$OD = \sqrt{r'^2 - \left(\frac{P}{2}\right)^2} - 1 \text{ since}$$

r' contacts the plate at B and $r' - r = 1$

$$DB = \frac{P}{2}$$

$$\overline{OD}^2 = r'^2 - \left(\frac{P}{2}\right)^2 - 2\sqrt{r'^2 - \left(\frac{P}{2}\right)^2} + 1$$

Therefore

$$OB = \sqrt{r'^2 - 2\sqrt{r'^2 - \left(\frac{P}{2}\right)^2} + 1} \text{ and}$$

$$EB = \sqrt{r'^2 - 2\sqrt{r'^2 - \left(\frac{P}{2}\right)^2} + 1} - r$$

Substituting numerically — EB = .02 of an inch

In spite of the fact that the plate was perfectly placed, an average thickness of .01 of an inch of metal would have to be ground with sand and water from its entire surface if 100 per cent efficiency were to be obtained. Similar clearances can be found in the case of an old plate and a new roll.

The vibrational stress set-up in a beater during operation, which makes it practically impossible to maintain proper clearance between the bed plate face and the face of the beater roll flybars, and thus lends itself to cutting of the fibers as between blades of shears, causes the theory of inherited beating equipment to be questioned. If hollanders are being used to beat by impact, violent agitation, and by hydraulic shear it seems that thought should be given to the development of beating equipment with these objects of design primarily in mind, or beating practice should be revised to take advantage of such equipment as has already been developed.

◆ ◆ ◆

First Paper Made by Electricity in 1896

THE total rated capacity for prime movers in the industry has been placed at a little over 2,600,000 hp. More than 1,600,000 hp. of this total, or over 60 per cent, is the combined rated capacity of over 50,000 motors that are installed in the various mills.

Surely such figures indicate the part that electricity plays in the present day operation of mill equipment, but seldom does one stop to think how recent is this important development. It is necessary to go back only a few years to find the first application of electricity for power purposes in the industry. This application, so far as is known, was made on July 10, 1896, in the plant of the Cliff Paper Company at Niagara Falls, N. Y., to operate the paper machines.

The major electrical equipment installed to permit this application of electrical energy consisted of two generators and two one-hundred horsepower motors, only one of which, according to a published record, was installed at the time when the test was made. The entire installation was so revolutionary that its operation was said to command much attention from both papermakers and engineers.

Today, only 37 years after this initial installation was put into operation, finds electricity being utilized within the industry for driving all kinds of equipment.

◆ ◆ ◆

A Lottery Financed Early Tennessee Paper Mill

By DOUGLAS C. McMURTRIE

IN THE file of the *Carthage Gazette*, of Carthage, Tenn., preserved in the fine newspaper collection of the American Antiquarian Society at Worcester, Mass., I recently found record of an early paper mill in the "Western country" which had not previously come to my attention.

A quaint method was used to raise the capital for the enterprise, William Moore, the publisher of the *Carthage Gazette*, determining upon a lottery as the best means of raising the necessary funds. The "Paper Mill Lottery" was first announced in the issue of May 25, 1809.

The subscriber, William Moore, "having for a long time labored under the difficulty of sending to a distance from this state for paper," proposes to dispose of varied property by lottery, to raise the required capital. The mill "will be situated on Charles's Creek in Warren County, and every exertion will be made to carry the business into immediate execution.

The last drawings in this unusual lottery were announced in the *Carthage Gazette* of June 8, 1810. Evidently, the scheme succeeded, for in the issue of March 8, 1811, we find the following announcement by William Moore.

"The subscriber informs his fellow-citizens that his paper mill is now in operation. He will give three cents per pound for clean linen and cotton rags, delivered at his printing office or at the paper mill."

And, then, there is an advertisement suggestive of the charms of Tennessee moonshine:

"Wanted at the Paper Mill, a good, sober Paper Maker and capable of carrying on the business—if immediate application is made to James Lyon, Warren County, or to the subscriber in Carthage, good encouragement will be given."

This is signed "William Moore."

This advertisement appeared for the last time in the issue of June 6, so it is to be presumed that the position was satisfactorily filled. But the display advertisements soliciting rags continued.

Breaks in the file of the *Carthage Gazette* prevent the compilation of a more complete record of this early Tennessee paper mill.

Proper Couplings

Insure Continuity of Machine Operation

By FRANCES A. WESTBROOK, M.E.

THE question of providing proper couplings between motors and the machinery used in the paper industry has received a great deal of attention both from the manufacturers of coupling equipment and from paper mill engineers. As paper mills run continuously, it is necessary to have machinery which is free from breakdowns in so far as it is practicable to make it so, and this, of course, means expensive machinery. However, continuity of operation can be no surer than the comparatively insignificant piece of equipment which transmits the power from the motor to the machine, whatever it may be. For this reason, it is poor economy to save on the cost of couplings at the expense of the service they can give, and it is very poor engineering to make a selection which is not the best for the conditions of service surrounding each type of machine.

The practically universal general requirement for couplings in the paper industry is that they should be flexible. This is because experience has shown that although shafting and machinery can be installed with almost perfect alignment, it is not possible to maintain it so indefinitely. Foundations are bound to settle somewhat; expansions and contractions of metal take place due to temperature change; and other operating conditions result in misalignment to some extent. Consequently a coupling having sufficient flexibility to take care of such discrepancies automatically is a practical operating necessity.

There are also two other basic characteristics which good couplings should possess. In the first place, they should be so designed that they will keep out foreign matter, such as dust, grit and moisture, and at the same time retain lubricating material without leakage. In the second place, there should be no flexing or bending of any of the couplings members.

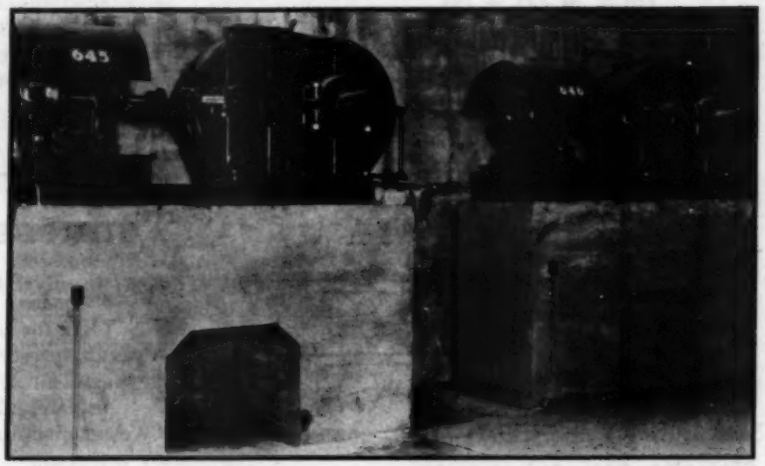


Figure 2

Figure 1 shows a Moore and White four-drum paper winder where flexible couplings have been installed between the motors and the speed reducers and again between the reducers and the winders. Figure 2 shows two couplings installed as part of an agitator drive system for circulating stock. In this installation, two other couplings are employed but they are hidden from view. One agitator is installed between each of the two low-speed shafts of the reducers and their respective agitators.

In addition, couplings of standard designs are used for paper machine drives, fans, conveyors, pulp grinders and numerous other pieces of pulp and paper mill machinery.

In the average mill there are a great many more points calling for couplings of standard design than those of special design. Nevertheless, there are certain services where special couplings are necessary and unless the right ones are selected, the results will be unsatisfactory. A typical case in point is the Jordan type coupling. Here a large amount of end movement of the Jordan plug is essential so that end adjustment must be provided for. It is also important that these couplings are free of vibration in order that excessive wear of the Jordan lining may be avoided, and that the stock passing through the

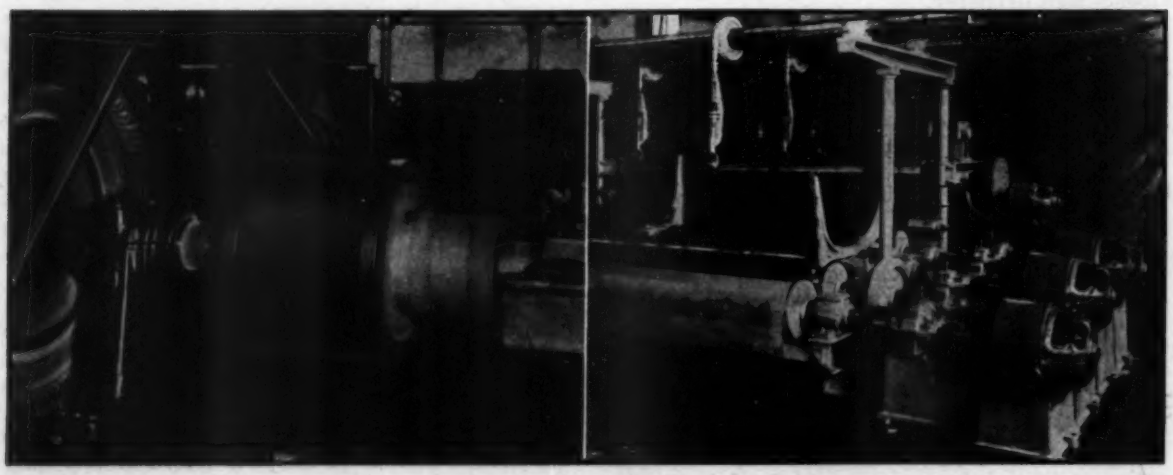


Figure 3

Figure 1

Jordan receives uniform treatment at all times. An installation of a coupling of this kind is shown in Figure 3. In this design provision has been made for the end adjustment by means of telescoping inner and outer sleeves.

Another special type of coupling design for use on Jordans or other machines where there are likely to be sudden and excessive strains is the shearing pin coupling. The number of pins and their size for any coupling of this kind may be varied in such a way that the shearing load can be very accurately adjusted to fit the conditions of operation. It is, of course, essential to adjust the pins to avoid costly breakdowns and not to give way with unnecessary frequency. It is also essential that such

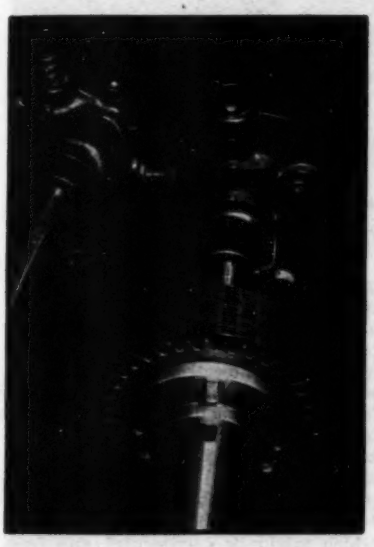


Figure 4

couplings are designed to permit easy and quick replacement of the sheared pins. An application of this type of coupling to a board machine is shown in Figure 4. Another machine on which similar couplings are used frequently is the rotary cutter, and there are, of course, other applications where they can be employed to advantage.

Probably the most important point to remember, and the one applying generally to practically all paper mill couplings, is that their essential characteristic from the standpoint of continuous operation is that flexing members should be avoided, and that the power transmitting member should be an internal gear or its equivalent.

❖ ❖ ❖

◆ THE APPOINTMENT of Roy C. Muir for three years assistant to the late Charles E. Eveleth, vice president in charge of engineering, as manager of the engineering department of the General Electric Company, was recently announced. Mr. Muir will have direct charge of the company's designing engineering in all of its various plants, the works laboratories and the general engineering laboratory at Schenectady.

◆ Program Given Out for Green Bay Supers Meeting

The program practically has been completed for the Fourteenth Annual Convention of the American Pulp and Paper Mill Superintendents Association, to be held June 8, 9 and 10 at Green Bay, Wis.

While the convention will not officially get under way until Thursday, June 8, a special sports program has been arranged for June 7, for the early arrivals. This program includes golf and luncheon at the Oneida Golf & Riding Club and a dinner at the Beaumont Hotel with Past President Fred C. Boyce as toastmaster. This dinner will be followed by the Auction of the Lost Derby and initiation of new members into the Ancient Order of Chinese Paper Makers.

The convention proper will be called to order Thursday morning by General Chairman Frank J. Timmerman. An address of welcome will be delivered by the Mayor of Green Bay, with a response by Vice President Herbert T. Randall.

President William H. Brydges will deliver his Annual Message, after which the following papers will be presented:

"Lubrication," by a representative of the Standard Oil Company of Indiana.

"Developments in Paper Mill Machinery," by a representative of the Black Clawson Company.

There will be a luncheon at noon with Frank Vaughan of the Bay West Paper Company as toastmaster and Jim Flynn of the Great Northern Railroad as speaker.

During the afternoon session the following papers will be presented.

"The Use of Zinc Pigments in the Paper Industry," by Dr. Otto Kress, Technical Director of the Institute of Paper Chemistry, and Howard M. Cyr of the New Jersey Zinc Company.

"White Water Utilization," by C. M. Baker, engineer of the American Paper and Pulp Association.

"Anticipating Maintenance Expense by Proper Inspection," by E. E. Berry, vice president of the Beloit Iron Works.

"Safety," by Mr. Waite of the Travelers Insurance Company.

"Constant Tension Regulator on Reels and Unwinding Stands," by R. H. Smith of the Reliance Electric & Engineering Co.

"New and Future Uses of Paper," by E. T. A. Coughlin, past president of the Superintendents Association.

"Windowless Paper Mill," by A. E. Montgomery, J. O. Ross Engineering Corporation.

"Benefits of Chromium to the Paper Industry," by a representative of the Chromium Corporation of America.

Ample time will be provided for visiting the exhibits of papermaking supplies and equipment.

There will be a dinner Thursday evening at the Beaumont Hotel with C. E. Jackson of the Consolidated Water Power & Paper Company as toastmaster.

The speaker of the evening will be J. M. Conway, president and general manager of the Hoberg Paper & Fiber Company, whose subject will be "Your Duties and Mine."

A paper by a representative of the Carborundum Company will be presented Friday morning and the remainder of the day will be devoted to a discussion of the various papers presented the day before.

Judson G. Rosebush will be the speaker at the luncheon Thursday and in the evening the banquet will be featured by an address delivered by Jimmy Gheen, papermaker from Ireland.

The Past President's Jewel will be presented as will be The Paper Mill Trophy.

Saturday will be devoted to visits to neighboring paper mills and to the Paper Institute at Appleton.

The special program for the ladies has been arranged under the direction of Mrs. A. E. Cofrin, providing for a luncheon and style show Wednesday, with dinner at Alaska Lakes. A visit to places of historical interest in Green Bay will occupy Thursday morning and luncheon at the Northland Hotel will be followed by bridge. Mrs. A. E. Winters and Mrs. J. W. McCormick will give instructions on contract.

Dinner at the Y. M. C. A. will be followed by a theatre party.

On Friday morning the ladies will visit the cherry orchards and state parks in Door County with stops at interesting points. Luncheon will be served at Maxwellton Braes, Baileys Harbor. The ladies will attend the Annual Banquet Friday evening at the Northland Hotel.

❖ ❖ ❖

◆ Standardize Corrugated and Solid Fiber Boxes

Simplified practice recommendation R146-33 covering corrugated and solid fiber boxes for canned fruits and vegetables has been accorded the required degree of acceptance by the industry, and is to be considered effective as of January 1, 1933, according to an announcement by the division of simplified practice of the Bureau of Standards.

This recommendation, which was formulated and developed by the industry, provides a simplified list of 41 different sizes of corrugated and solid fiber boxes. The sizes of these shipping boxes are based on standard units of pack for the 27 simplified sizes of fruit and vegetable cans as approved by a conference of the industry on January 20, 1931.

◆ R. G. Whale With Nekoosa-Edwards

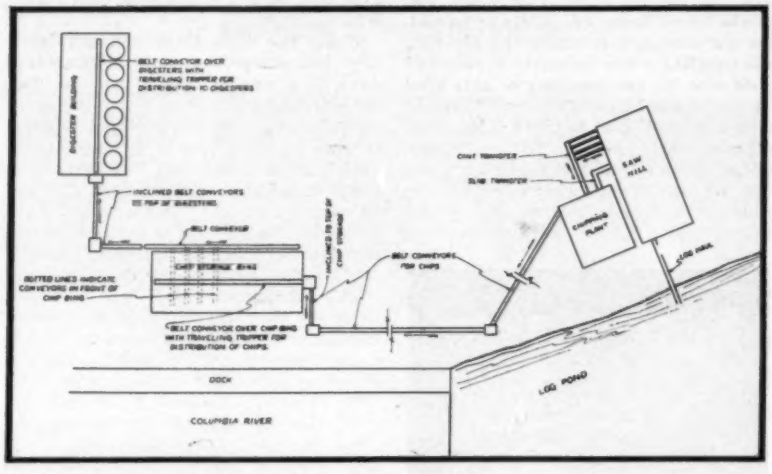
R. G. Whale has joined the Fine Paper Division of the Nekoosa-Edwards Paper Company with headquarters at the mill office in Port Edwards, Wis. He will assist in the developing of fine papers and in promoting sales and advertising.

Mr. Whale is well qualified for his new post. Thirteen years ago he started in the paper industry with the Fox River Paper Company at Appleton, Wis. For the past ten years he has been with the Butler Paper Corporation, for the past three years having been Secretary in charge of sales promotional work.

Pacific Coast Pulp Mill

Has Interesting System for Preparing and Handling Chips

By D. L. SHIRLEY
Manager Link-Belt Company,
Portland, Oregon


BELT CONVEYOR OVER DIGESTERS WITH TRAVELING TRIPPER FOR DISTRIBUTION TO DIGESTERS
DIGESTER BUILDING
INCLINED BELT CONVEYORS TO TOP OF DIGESTERS
BELT CONVEYOR
CHIP STORAGE BINS
DOTTED LINES INDICATE CONVEYORS ON FRONT OF CHIP BINS
INCLINED TO TOP OF CHIP STORAGE
BELT CONVEYORS TOP CHIPS
CHIP TRANSFER
SLAB TRANSFER
SAW MILL
CHIPPING PLANT
LOG HAUL
BELT CONVEYOR OVER CHIP BINS WITH TRAVELING TRIPPER FOR DISTRIBUTION OF CHIPS
DOCK
COLUMBIA RIVER
LOG POND

Sketch showing general arrangement of conveyor system

LATE in 1931, the Weyerhaeuser Timber Company, Pulp Division, Longview, Washington, completed and put in operation a most modern 175-ton sulphite mill with many new and interesting features throughout. In particular, close attention was given to handling and preparation of the wood, and the handling of the wood chips.

In connection with the Weyerhaeuser Company's extensive timber and sawmill operations, ideal conditions prevail for the selection of the finest type of logs for producing the highest grade pulp, and in the development of this plant, extreme care was taken to insure absolute control, and elimination of uncertainty in every stage in the various processes. Connecting the pulp mill with the sawmill operations, presented unusual problems, as the pulp mill proper was located nearly half a mile from the source of wood supply.

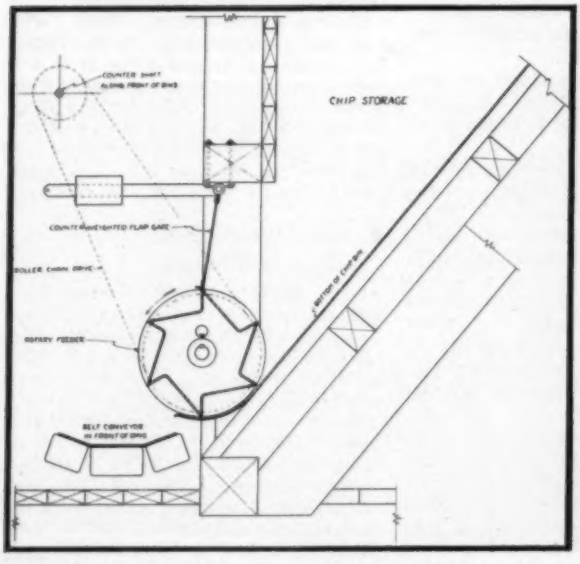
The chipping plant was located adjacent to one of the sawmills, simplifying the delivery of raw material, as well as permitting the disposal of waste wood desirable for fuel, by means of slight additions to the fuel conveyor systems already in use between the mills and the power plant. Logs are broken down into cants of the largest convenient dimensions to eliminate waste, generally 8 in. x 8 in. x 8 ft. long. These cants are delivered from the mill transfer chains to a flat belt conveyor, which in turn delivers them to the chipping plant. In this plant they are barked on new machines of special design, defects cut out, and knots are removed on specially designed knot-boring machines. Every precaution is taken to deliver only clean, first-class wood to the chippers.

Slabs are similarly transferred, but delivered to a double strand roller chain conveyor of special design, which delivers to the conventional hand barkers for cleaning before going to the chippers.

Special attention was directed to details in chipper design to insure production of chips of uniform length.

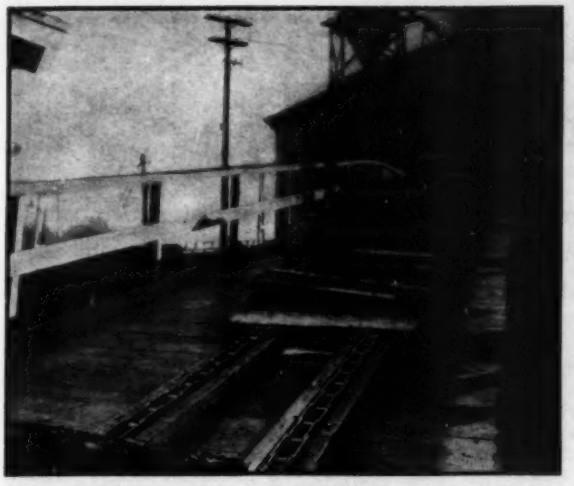
After passing through the chipping plant, good chips for delivery to chip storage are handled on a belt conveyor a distance of approximately half a mile to a separate chip storage building of unique design, located on the ground adjacent to the digester building. Inclined belt conveyors deliver the chips overhead to the traveling belt conveyor tripper for distribution into the various storage bins. At every stage of the preparation of these chips, extreme care is taken to eliminate foreign material which might be detrimental, and from the chipping plant to chip storage, the supply is protected by completely enclosed buildings, designed to exclude dirt, cinders, or other impurities.

The chip storage building is con-



Sectional diagram of chip bin showing rotary feeder

Installation view of rotary chip feeders



Slab transfer conveyor between Mill No. 3 and chipping plant

Interior view of chipping plant showing network of conveyors

structed with a Lamella-type roof, and is divided into twelve sections or compartments, each fitted with a hopper bottom which provides maximum storage for the cubic area of the building and absolute rotation of chips.

A new, and what has proved to be highly successful, method of withdrawing chips from storage was provided by installation of special-design rotary feeders in each row of bins, each row being operated independently of the others, discharging to short belt conveyors in front of each row of bins, all of which in turn deliver at right angles to one main conveyor, leading to the digester building. This design permits selection of chips from any point in the available storage, permitting segregation of chips if that should be desirable, and insuring a certain supply at all times. Failure of one or even of several feeders and conveyors would not delay delivery of chips to the digesters. This arrangement is a very flexible and satisfactory one, and has eliminated much expensive construction to provide chip storage above the digesters, which has been the design in many plants.

The capacity of the main belt conveyor, which is inclined and delivers to the belt conveyor over the digesters, is ample to handle the maximum demand and by operation of the desired number of feeders and conveyors from storage bins, the rate of delivery can be accurately controlled. Delivery to digesters is accomplished by means of a traveling belt tripper discharging to digester loading chutes.

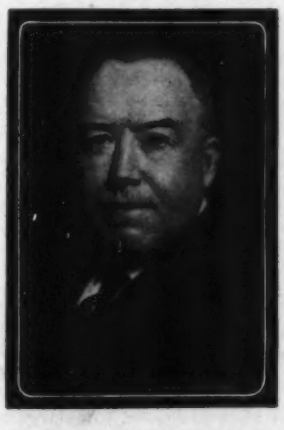
In an operation of this character, dependability is of very great importance, and the extensive use of conveying equipment at important points indicates the confidence the designing engineers placed in this equipment.

Some 12,000 feet of conveyor and power transmission chains, the special slab transfer chains, belt conveyor rolls over digesters, screw conveyors and the complete rotary chip feeder equipment, were manufactured by the Link-Belt Company.

Thomas J. Keenan

THE many friends of Thomas J. Keenan, who was a member of THE PAPER INDUSTRY staff for the past eight years, will be shocked to learn of his passing. His demise was sudden, neighbors discovering his body in his home at South Orange, New Jersey, on May 1.

Mr. Keenan was born in Dundee, Scotland, sixty-seven years ago. He attended public school in Dundee, later



studied chemistry in Paris, France, and then followed chemistry in London, where he received his degree.

Upon coming to America, he became a pharmacist at the Roosevelt Hospital, New York, and somewhat later was made Associate Editor of *American Druggist*. In 1911, he left his editorial work because of ill health. Upon his recovery he became associated with the magazine, *Paper*, as Managing Editor, serving in this capacity until March, 1913, when he was made Editor.

On February 19, 1915, Mr. Keenan was appointed as one of a committee of six to draft the original articles of organization for the Technical Association of the Pulp and Paper Industry. On May 6, 1915, he was elected its first Secretary-Treasurer, which office he filled for several years, divorcing himself in the interim from his association with *Paper*. Upon retirement from his activities with the Technical Association, he returned to the magazine and continued as Editor until the publication was consolidated with a contemporary during the early part of 1925.

In May, 1925, Mr. Keenan became Associate Editor of THE PAPER INDUSTRY with headquarters in New York City. He served in this position until July, 1932, when he was made Contributing Editor, and in this relation functioned until the time of his passing.

Mr. Keenan's career was a succession of scholarly attainments. He was a capable editor, a gifted writer and a keen student. Because of his association with the trade press of the industry, he was a familiar figure at many of the leading conventions; the task of reporting these meetings, while a laborious one to many, was to him a real pleasure. His loss will be keenly felt by a host of friends, and this magazine will miss his interesting contributions.

Mr. Keenan was laid to rest May 3 beside Mrs. Keenan, who preceded him last October. Following her passing, he took a three-month trip abroad, visiting a sister and two brothers who reside in Scotland. During this trip he was also the guest of Dr. A. St. Klein in Germany.

❖ ❖ ❖

◆ CHARLES FRANCIS ADAMS, Secretary of the Navy during the Hoover administration, was elected a director of the General Electric Co. at the annual meeting of stockholders on April 18. The other directors were re-elected.

◆ AT A RECENT meeting of the board of directors of D. J. Murray Mfg. Co., Wausau, Wis., the following officers were elected: F. C. Boyce, president; M. P. McCullough, vice president; J. S. Alexander, treasurer; C. E. Staky, secretary. In addition to the officers, the following constitute the board of directors: D. C. Everest, Geo. E. Foster, Grover Keeth, J. F. Ross and W. L. Edmonds.

Paper Representatives Join in Forestry Meeting

Georgia Forestry Association entertains paper industry delegates in historic Savannah. Dr. Herty's research activities center of interest.

THE most striking feature of this joint meeting has been the cordial welcome of the Georgians, the frankness with which the visiting paper men have expressed their doubts as to the advisability of establishing a newsprint industry in this section at this time, and the appreciative spirit shown by the hosts in receiving these frank expressions of opinion. Though seeking to efface himself in so far as possible, Dr. Chas. H. Herty really dominated the convention and struck the keynote when he said to the visitors, "Our laboratories and our records are open to inspection, and if you can find any flaws in our work please tell us about it, for if there is anything wrong we want to know it before we go any further."

The visiting paper men took him literally, delved into everything and expressed themselves quite frankly on all points. Their first reaction seemed quite generally to be one of amazement at the completeness and excellence of the equipment. Among the guests were chief engineers, managers, superintendents of mills and directors of research and of control laboratories. All were astounded at the excellent tools placed at the disposal of the personnel of the Paper and Pulp Laboratory. And though some expressed a little disappointment at the lack of data on some of the chemical characteristics of the pulps that had been produced, they were quick to recognize the handicaps of the restricted budget with which the work is being carried on.

The meeting was called to order promptly at 10:30 a. m. Monday, May 1 in the Gold Room of the DeSoto Hotel by Judge Ogden Persons of Forsythe, Ga., First Vice President of the Georgia Forestry Association, in the absence of T. G. Woolford of Atlanta who had been called to Washington. Seated beside Judge Persons was Mayor Thomas Gamble, editor *The Naval Stores Weekly*.

In welcoming the seventy-odd visiting paper men, Judge Persons called attention to a large bowl of sweet peas upon the speaker's table which had been sent by Senator Morgan and expressed regret that the visitors could not have seen the splendid pageant of the previous week commemorating the bicentennial of the founding of Savannah in 1733. Georgia, he said, was the only American colony to hold a charter direct from the British crown. It was formed as a buffer state between the Spanish Floridas and the French Louisiana. It was remarkable that the English were able to enter the American continent two centuries after these two great Latin nations and thrust both of them aside and take for themselves the North American continent. The original confines of the colony of Georgia were from the Atlantic to the Mississippi and from the Floridas to the North Carolina line. The early settlers had to fight for this land and on a little knoll only 18 miles from Savannah they fought one of the decisive battles of the New World, the battle of "Bloody Marsh," where more than six thousand of the best trained Spanish troops from Cuba and St. Augustine under direct command of the governors of Cuba and of Florida were defeated by less than six hundred American colonists of English and Scotch blood who were battling for a home in the new world.

Judge Persons spoke at some length about the historic points of interest and the traditional hospitality of the people of Savannah, and read a quotation from the *Manufacturers Record* in which it was estimated the South has a pulp-making capacity of a million tons a year, and in 1930 produced 600,000 tons of the 883,000 tons of domestic unbleached sulphate pulp. In the South, there are more than 100 million acres of cut-over forest lands capable of producing twenty times the present production of pulp.

"The chemist who can adapt the resources of nature to a larger service to mankind is a public benefactor," said Judge Persons, "and Dr. Herty by his success in turning the Southern naval stores operators away from the wasteful box-cutting system to the use of cups became such a public benefactor. Now, by demonstrating the suitability of these Southern pines to the manufacture of newsprint, he has become a public benefactor in even larger degree." The speaker then proceeded to enlarge upon the work of other public benefactors who have worked in Georgia. He referred to Nathaniel Greene, one of George Washington's most successful generals, who came from Rhode Island and freed Georgia soil of British troops. The grateful people of Savannah conferred upon him a 4,000-acre plantation, 12 miles from the city, known as Mulberry Grove. He settled there after the War of Revolution, but died the following year. His widow had a visitor, Eli Whitney, who put together the first mechanism for speeding up the removal of the cotton lint from the seeds. It was a crude affair consisting of a cylinder with saws and a breastplate. From it has evolved the modern cotton gin which has enabled the South to occupy the predominant position in the export of American agricultural products. Similarly, David Wesson, working on Georgia soil, developed the manufacture of nutritive oils from cottonseed which had hitherto been considered only waste.

In speaking of the South's advantages, Judge Persons stressed the abundant reproduction of the forests, the excellent water, mild climate, existence of good papermaking china clay, now used for two-thirds of the clay-bearing papers in the United States, low taxes, abundance of good labor at moderate wages, existence of railroads, highways and water transportation, etc., and predicted that Georgia is destined to become the future seat of the paper industry of North America. He closed in true Southern oratorical style with a peroration of welcome to the visiting paper men on behalf of the Georgia Forestry Association.

Southern Pine Newsprint Considerations

The second speaker was W. G. MacNaughton, whom Dr. Herty calls his "wheel horse" in the work of the Pulp and Paper Laboratory. MacNaughton began with words of praise for the Southern cooks and said he had to put himself under great restraint to keep from putting on weight. He said that in his estimation Savannah compares with Quebec in interest and charm, and he warned the visitors who came by boat not to think of leaving before the final date of their return ticket. He then read part of a joint paper prepared in collaboration with W. F. Allen, on "Georgia Pine Sulphite and Groundwood for Newsprint." He was followed by Mr. Allen who read the remainder of the paper. Preprints of this paper were distributed.

Mr. MacNaughton said that he was just beginning the study of the effect of grinding with a carborundum stone, received last week, using a burr having 9-thread with 3½-inch lead. Mr. Allen began by describing the sulphite digester which is of chromium-nickel alloy of 60 cubic feet capacity and has a forced circulating system operating at 60 gallons per minute. The charge, including moisture in wood, amounts to 350 gallons of liquid, so the circulating system makes a complete cycle every six minutes. A few cooks were first made to determine practical limits, etc. He stressed the point that thorough penetration below 110 deg. C. is the first essential and the next is that the rise

from 110 deg. to 120 deg. C., must not be accomplished in less than two hours.

Both Messrs. MacNaughton and Allen stressed the fact that the very great difference between spring and summer wood in the Southern pines complicates the problem of cooking or of grinding. The two kinds of fibers are so very different that it is like dealing with two different species in one. Instead of the resin being the chief difficulty, they have found this spring vs. summer wood the most difficult problem to cope with. At the laboratory, slides were exhibited showing both kinds of fibers. In discussing this problem, one of the visitors suggested cooking each separately; i. e., cook out spring wood and then re-cook the summer wood. In other words, a two-stage cook.

The fourth speaker was Col. E. George Butler, of the A. E. F., now retired, member of Butler Brothers & Co. construction engineers. He was introduced as "a colonel who looks like a top-sergeant and has been made responsible for your entertainment." Col. Butler prefaced his remarks by an announcement that upon adjournment all were invited to the roof where liquid refreshments would be served in "Hit-the-Deck." "Savannah and Chatham County," he said, "does not believe in letting the rest of the country take away its liberties and you are merely to express your preference whether plain ginger ale or whatever else."

Col. Butler apologized for not having ready for distribution copies of his "brief" giving the facts as to the resources of Georgia. He mentioned briefly the following: 159 Georgia counties each have three or four streams of good fresh water; three power companies with rates as satisfactory as obtainable anywhere; fourth largest brick producing state; limestone known the country over; pine timber best of any for construction purposes; gravel can be taken from any of the streams; labor is satisfactory and low in cost. On account of mild climate cheaper type construction possible.

There are now shipped out of the state: clay to supply 60 per cent of domestic consumption; rosin; alum, made in Atlanta; and sulphur and salt can be had from Louisiana. For the next ten years it will be possible to purchase from landowners 500,000 cords a year of pulpwood at not over $4.00 a cord, or land can be bought at $3 to $6 an acre. Thinnings from natural reforestation will supply the pulpwood. Carrying charges on timber reserve will run around 10c to 15c per acre per year, fire protection 5c. The pines do not top-fire like some woods. Year-round logging is possible, and there is no need of reserve supply.

Tidewater transportation is possible and the Chamber of Commerce will aid in establishing suitable rates.

Georgia has an abundance of native, intelligent Anglo-Saxon labor, readily adaptable, quick to learn, and not given to making labor troubles. Also negro labor for woods operations, etc. Wages are reasonable.

The final speaker of the Monday morning program was Chas. W. Boyce, secretary of the American Paper and Pulp Association, who was introduced by Judge Persons as one who has his finger on the pulse of the paper industry. In discussing the economic aspects of the paper industry Mr. Boyce emphasized the factors of Regional Competition in Pulpwood. He said:

"We have heard the story of the technical accomplishments, let us now consider carefully what are the economic possibilities. I have intimated upon other occasions that there are some doubts as to the possibility of developing a white paper industry in the South at the present time because the production of white papers in North America is already greatly in excess of consumption. Dr. Herty is a brave man to invite me to discuss with you the economic aspects of the possibilities of establishing a white paper industry in your midst. Upon second thought, however, I am inclined to think Dr. Herty has deliberately chosen to challenge the expression of opinion however adverse it may be. For I am sure that he is a man who is seeking the truth regardless of whether it be in line with the program he has conceived or not.

"The North American paper industry is not a static industry. It is intensely dynamic. This has been fully demonstrated in the past three years. See what has taken place in Canada! Northern European countries have sought to achieve liquidation by exporting woodpulp. Their depreciated currencies have enabled them to undersell both United States and Canadian production. We now have bankruptcies of newsprint mills by wholesale. In the 20's, the paper industry forged ahead. The trend of consumption was upward. Now, however, consumption is on the downward trend. Thousands of battles have been fought on the beach to retain a stake in the great American market."

Stability in the paper industry has vanished. Yet the industry as a whole is strong for adjustment. This visit of the representatives of northern and of Canadian paper men is a proof of this. There are great possibilities in your Southern territory. There are also equally great problems in the economic development. The older paper making regions in spite of the handicaps which face them still possess elements of great strength and will not yield easily. Age does not mean lack of vitality.

In 1910 this country coupled with the principle of free speech that of free paper. Newsprint went on the free list and the United States mills were faced with gigantic competition from Canada. Some of the American mills were forced into the production of other grades of paper. Those mills which had foreseen the possibility continued to carry on. In spite of the Canadian government's policy of liquidating its wood and power the United States mills have maintained their normal production.

In the 1920's came the development of Southern kraft. Here has been developed a large tonnage at fair cost, but with West Coast developments there has been economic war and all have been weakened. None have won. Yet the kraft industry in the Lake States continues to carry on. There has, however, been a shift away from spruce to the Northern pines. Under pressure of necessity other elements have proved more powerful than low production costs. Nevertheless the nation looks to the South and the West for use of its capital and resources in competition with foreign imports by a program of diversification.

In the picture of foreign competition there are elements of political considerations that throw things out of economic balance. It may not be impossible to establish a white paper industry here in the South, but until the competitive power of the South is demonstrated the possibility must not be taken for granted. Regional expansion in paper manufacture must begin with technical research and this must be followed by commercial development. Prior to the World War the American paper industry was essentially founded upon spruce. When the boom years of the 1920's brought expansion the industry was forced by a lack of domestic supplies of spruce to turn to other woods, viz.: hemlock in the Lake region and the West and pine in the South and West. This change in species put spruce under deflation. This wood no longer has a preferred value. There is now no premium for quality. The price of spruce pulpwood is on the same basis as other woods, viz.: cost at mill site. We cannot say that Southern pine is 100, spruce 200, Lake States hemlock 175 and West Coast hemlock 125, etc. Technical advancement is rapidly eliminating all differentials based on quality.

In order to become a real papermaking region, the South must be able to market its products in the centers of greatest consumption in competition with existing producing regions which have the advantage of more advanced technical skill and experience. The nine states bordering on the south Atlantic and Gulf have a combined consumption of 225,000 tons of newsprint, or 6 per cent of the annual United States consumption. This market would support two modern newsprint mills which would have an advantage in this limited area. If the industry is to attain significant proportions it must be able to compete in a zone 250 miles wide stretching from Baltimore and New York to Chicago and St. Louis. This zone is about equally distant from the Canadian and the Southern regions of production. We may expect, therefore, that freights would approximately balance. The advantage to the South lies in her cheaper wood. In spite of what Col. Butler has just told us about the cheaper costs of mill construction in the South I doubt if mills can be built here at any lower cost than will be represented by the capital investment in Canadian mills after completion of the squeezing process now going on there. Bondholders are taking huge losses on Canadian mills and in the new capital set-up the overhead will be no higher than on the mills that could be built in the South. Then there is the question of

European competition. News contracts to run five years are being offered in this country at a price of "eight dollars under the market, whatever this may be."

Southern kraft had to go into the consuming centers and establish itself and other grades that may be made from your Southern woods will have to do the same. The wood cost is from one-third to one-half the cost of woodpulp and the South has a tremendous supply. In the region from Virginia to Texas there is a wood supply adequate for the entire needs of the United States paper industry if it could be used for the manufacture of all grades of papers. But even granting all these advantages the South will be forced to compete in the principal consuming centers where freight differentials will very largely determine its competitive position.

Regional spreads of the 1920's will never be re-established. The South and the West are not now competing but will in the future as the South works itself more and more into the specialty field. The West has the advantage of being already in that field. An establishment of economic balance between competing pulp producing regions was bound to occur eventually, but has been hastened by decreased consumption and depreciated currencies.

Though you have more trees per acre the growth in tons per acre per year of pulp making material is as great in the West as it is in the South. You have the advantage of turpentine integration.

No mill should be established without its own reserve. The triple purpose tree of the South is perhaps destined to lead the way to a sustained land use in forestry analogous to that in agriculture. The paper industry asks of the South only temperance in expansion and not a repetition of what has occurred in Canada.

Following the reading of his paper, Mr. Boyce was accorded a rising vote of thanks by the members of the Georgia Forestry Association and the visiting representatives of the pulp and paper industry. In thanking him for his paper, Judge Person stressed the need for sober judgment in attempting to develop a white paper industry in the South.

Following a complimentary luncheon at the DeSoto Hotel at which there were no speeches of any kind, just interesting discussions by various groups, the visitors were taken in automobiles to the experimental paper mill where they observed the grinding of slash pine and the manufacture of newsprint on the experimental fourdrinier.

Banquet Meeting

In the evening there was a banquet at which Judge Person again presided. Mayor Gamble read a carefully prepared paper in which he recounted the fact that discoveries often are made long in advance of their adoption in practical application which must await the impulse of some mind keen to observe and to apply the facts. He instanced the discovery 75 years ago that light chipping was adequate for turpentine production and would lengthen the life of the tree, but this was not applied until 50 years later when Dr. Herty showed the naval stores men how to put on a light streak and use cups instead of boxing the tree. This prolonged the tenure of the naval stores industry which in normal times means an annual income to the state of Georgia of 20 to 25 million dollars. Again an observation by Roth that young pines contain less resin than was thought awaited the attention of this same Dr. Herty who has now demonstrated that the South is the logical place for the newsprint industry.

The second address at the banquet was delivered by Allen Abrams, President of the Technical Association of the Pulp and Paper Industry and technical director of the Marathon Paper Mills Co., Rothschild, Wis. Mr. Abrams spoke convincingly of the economic phase of papermaking, with particular emphasis upon the invasions of new fields and the need to be fortified properly rather than to fall headlong into new developments that are not sound. He considered the possibility of establishing a sulphite or white paper industry in the South a most interesting one, but he expressed the thought that it would take a considerable period of further research and experimenting before successful commercial development should be expected. It was pointed out that there are yet many problems to be solved which must be worked out both on a scientific and practical basis. He felt sure that Dr. Herty realized this to be true and that he was fully prepared to pursue such a conservative and carefully thought-out program. He spoke in considerable detail of the favorable natural resources of the South, and assured those present that the progress of the work in the South would be followed with a great deal of interest by all interested in the development of the industry.

The second day, Tuesday, was devoted principally to a consideration of the subject of reforestation. Tours had been arranged for the inspection of woods operations, chipping, dipping and distillation of crude gum.

On the morning of the last day, the guests were taken on an extensive automobile tour to all points of interest, after which a reception and luncheon at Wellesly Manor, the country estate of Judge Arthur W. Solomon, was the closing event of the meeting.

❖ ❖ ❖

◆ Forestry College to Operate Unemployment Camps

In co-operating with President Roosevelt's forest workers plan for the relief of unemployment, the New York State College of Forestry has promptly made available two of its largest experimental forests and two camps of 200 workers each. Dean Samuel N. Spring, of the college, has announced that a camp of 200 civilian workers will be established on the Huntington Wild Life Experiment Station of 13,000 acres which is located near Newcomb, N. Y., on the Chestertown Long Lake highway in the heart of the Adirondacks.

Another camp of 200 workers will be established in the vicinity of Cranberry Lake. On the shores of this large Adirondack lake the college operates two forests. The largest is used for instructional and experimental purposes by the New York State Ranger School near Wanakena, N. Y., which is a division of the college. This area is composed of 2,300 acres of forest land logged prior to 1908 and in that year swept in part by forest fires.

Another forest of 1,000 acres seven miles from the Ranger School on the shores of the lake is the site of the Sophomore Summer Camp of the college. Students in their sophomore year are sent there for field work. The college has made plans for the development of this forest. Work on the area can be accomplished by sending unemployed from the main camp. The employment of the civilian workers on this forest will be of great advantage to the college in that it will widen the possibilities for instruction of the sophomore students.

These two camps will be under the disciplinary control of the army but the work will be laid out by members of the faculties of the New York State College of Forestry and the New York State Ranger School. Work will start just as soon as the camp locations and set-up can be made.

◆ T. A. P. P. I. Converting and Consuming Division

The Technical Association of the Pulp and Paper Industry has endeavored to organize itself to meet the particular requirements of its members. Analyses of the membership from time to time shows distinct trends that must be taken care of. The eighteen years of its existence enabled many of its members who were mill chemists or engineers in 1915 and 1916 to become mill managers and executives. To serve these members a management division was organized two years ago.

The competition between materials and the demand for a more scientific knowledge of use requirements of paper has led many companies to consider the direct introduction of technically trained men into their sales organization or to have such men work in co-operation with their salesmen in meeting their customers and studying their technical problems relative to the requirements of papers in use.

To meet this new and growing requirement, the Technical Association has organized a converting and consuming division which is dealing with the fundamental subjects of paper coating, paper and board laminating, container manufacture, and the graphic arts industries.

A. W. Nickerson, of the research department of Robert Gair Company, was selected as general chairman of the division. With him are associated J. J. O'Connor of the Mead Corporation as chairman of the Coating Committee; E. C. Lathrop, formerly of the Celotex Company and now a consulting engi-

neer, as chairman of the Laminating Committee; Pierre Drewsen, of the Hinde & Dauch Paper Company, as chairman of the Container Committee; and Charles Clarkson, vice president of the International Printing Ink Corporation, as chairman of the Graphic Arts Committee.

The Coating Committee recently held symposia on coating, adhesives and pigments. Its plan is to investigate the technical aspects of paper coating with such materials as casein, starch, glue, gum, wax, size, varnish, cellulose esters, etc. Its field of work covers both water base coating and non-water base coating.

The Laminating Committee will interest itself in the processes of laminating into multi-ply articles such as wallboard, corrugated and solid fiber, blotting, cores and spiral tubes and display cards.

The Container Committee will deal with the processes of conversion to containers such as folding boxes and cartons, set-up boxes, pails spiral containers, envelopes and bags.

The Graphic Arts Committee will cover the processes of printing, ruling, folding, stapling, etc. At the annual meeting of the association in February, this committee conducted an interesting and well attended meeting dealing with printing paper requirements.

With the chairman of the aforementioned committees are associated groups of individuals who have had many years of experience in their respective fields. It is expected that the work of the division will do much to bring the maker and user of paper to a common understanding of these problems and to a satisfactory solution of them.

◆ Oregon Pulp and Paper Installs New Turbines

The Oregon Pulp and Paper Company, Salem, Oregon, has effected important economy of power consumption at its plant by the installation of a steam balancer set for producing the direct current and excitation required for the sectional drives on the four paper machines in the mill. Each of these units consists of a General Electric D-58 steam turbine, connecting through reducing gears to a synchronous motor, a direct-current generator and exciter.

The exhaust steam from the four turbines is utilized for the dryer sections of the four paper machines. Previous to making the steam required for those dryer sections was supplied direct from the boilers by means of a reducing valve, entailing a considerable consumption of energy.

In addition to furnishing direct current energy, when the steam requirement is of sufficient volume, the synchronous motor is operated as an alternating-current generator, thus feeding a-c energy back into the power supply system.

The turbines serving the four paper machine units develop approximately 500 kw. of electrical energy with no increased demand on the boiler plant for the machine dryer sections. This results in a substantial reduction in the paper company's bills for purchased power. The amount of energy thus produced, of course, varies according to the class of paper being made and the speed at which the paper machines are operated.

Assuming that the four paper machines are operated on regular schedule production it is figured that by this saving the cost of turbine installations, including changes in steam piping and foundation, may be repaid within less than four years.

◆ THE BORREGAARD Company, Inc., has moved its New York office to 386 Fourth Avenue.

THE PAPER FOUNDATION

Announces Plan for Exhibit at Progress Exposition

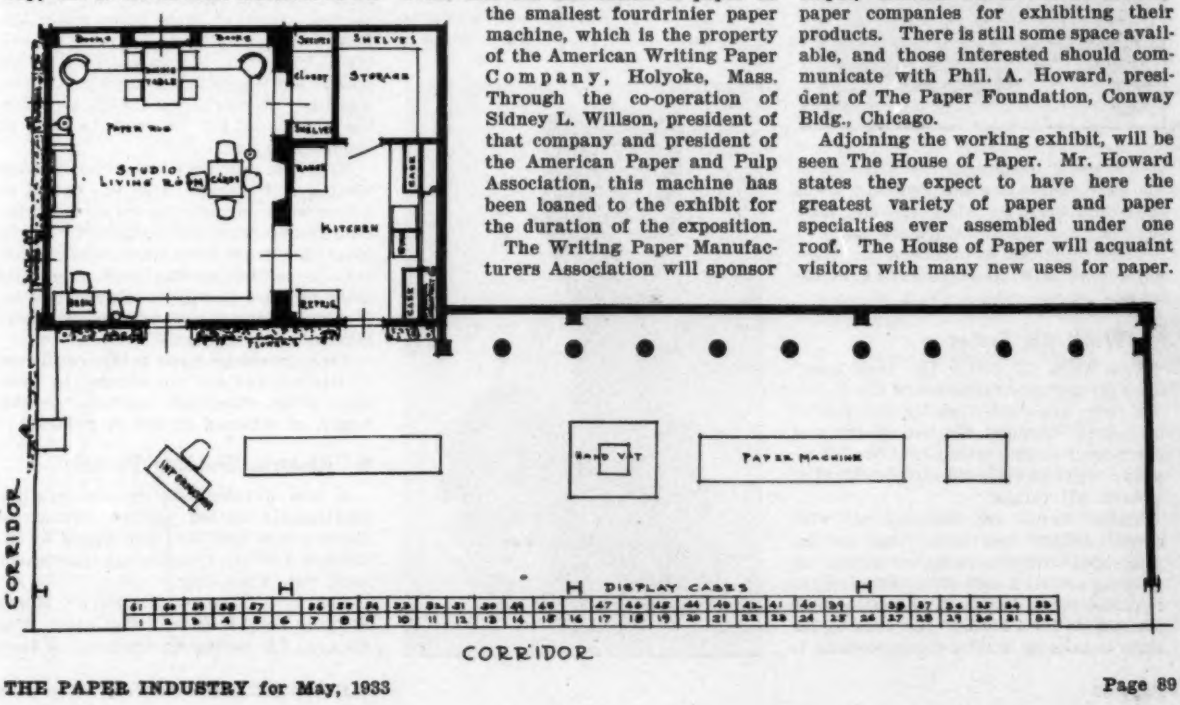
AN INTERESTING and workable plan is announced by The Paper Foundation for its exhibit at A Century of Progress. The accompanying diagram shows the floor plan of the exhibit which will occupy one of the choicest locations in the Graphic Arts Section of the General Exhibit Building.

Parallel with the main corridor is a space 75 ft. by 20 ft. Here will be exhibited the actual making of paper by hand, also the fabrication of paper on the smallest fourdrinier paper machine, which is the property of the American Writing Paper Company, Holyoke, Mass. Through the co-operation of Sidney L. Willson, president of that company and president of the American Paper and Pulp Association, this machine has been loaned to the exhibit for the duration of the exposition.

The Writing Paper Manufacturers Association will sponsor the making of paper by hand, and all papermaking operations will be conducted by students from the Institute of Paper Chemistry, Appleton, Wis.

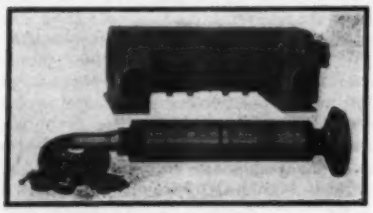
Along the wall may be seen individual display cabinets which will be used by paper companies for exhibiting their products. There is still some space available, and those interested should communicate with Phil. A. Howard, president of The Paper Foundation, Conway Bldg., Chicago.

Adjoining the working exhibit, will be seen The House of Paper. Mr. Howard states they expect to have here the greatest variety of paper and paper specialties ever assembled under one roof. The House of Paper will acquaint visitors with many new uses for paper.



◆ Concentrated Energy

The Louis Allis Company, of Milwaukee, Wis., has developed a new motor of unusually small diameter for its capacity. A full one hundred horsepower unit



is built into a motor less than 12 inches in diameter.

This development illustrates how motor proportions can be accommodated to limiting space requirements in many applications throughout industry.

◆ Switch Fitted Valve

A check valve equipped with a mercoid flow switch has just been introduced by Barrett, Haentjens & Co., Hazleton, Pa. This new switch fitted valve is designated as the type "M" check valve.

The switch is connected into the low-voltage coil of the motor starter, and is actuated by the valve flap. When the pump is in operation and delivering

water, the flow through the valve raises the flap and closes the switch. When the pump loses its water the flap falls, the switch opens, and stops the pump.

The switch can be arranged for either horizontal or vertical mounting of the valve.

◆ Wulff pH Tester

The Wulff pH tester has been developed for the determination of the hydrogen ion concentrations of liquids or semi-fluids through the use of dry and permanent color standards. The standards consist of celluloid strips colored to definite pH values.

These strips are matched up with small celluloid test strips that are impregnated with a suitable indicator. In making a test, a test strip covering the required range is placed in contact with the sample for a known time causing the strip to take on a color corresponding to the pH of the test material. This color is then compared with a set of standards. If by chance the color falls beyond the standard, the next indicator must be tried. This apparatus, according to Pfalty & Bauer, Inc., 300 Pearl Street, New York City, will permit a reading to be obtained within 0.1-0.2 pH.

◆ Controllers for Synchronous Motors

All standard lines of General Electric synchronous motor control have been superseded by new lines incorporating new and important features. Included in this control equipment are relays for automatically applying and removing field excitation and for protecting the stator and amortisseur windings under all operating conditions.

In addition to a means for automatically applying field excitation near synchronism, the new controllers are provided with a power-factor field-removal relay which automatically removes field excitation when the motor drops out of synchronism.

They are also provided with a two-element temperature relay for protecting the stator windings. Likewise, a temperature squirrel-cage protective relay is included to protect the amortisseur windings under all operating conditions. A new Telechron motor-operated timing relay is used to initiate the transfer from starting to running connections on reduced voltage and part-winding controllers.

◆ Dry Chemical Feeder

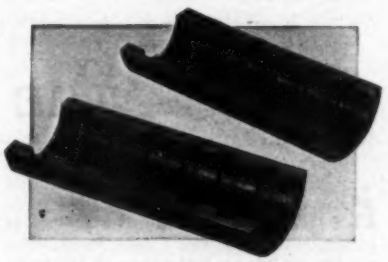
A recent equipment development of the International Filter Co., Chicago, Illinois, is their No. 8 dry chemical feeder. In operation the powdered or granular material being fed passes from the storage hopper of the unit into a revolving cylinder, which is retained by a stationary ring and supported by a revolving table. During each revolution of the table an adjustable knife, fitted in the stationary ring, cuts off a definite amount of the powdered or granular material within the cylinder. This material, deflected through an opening in the stationary ring and pushed off the edge of the table, is dropped into a vortex mixer. This mixer assures a thorough wetting and mixing of the material and draws dust down into a water funnel.

The feeder is claimed to handle consistently only a fraction of a pound per hour, or substantially larger amounts at maximum setting. The minimum feed range for alum is 8 ounces while the maximum is 150 pounds per hour. With other materials the capacities and feed ranges will vary depending upon the differences in physical characteristics.

◆ Moulded Non-Metallic Bearings for All Services

Gatke bearings, for a number of years made exclusively for steel mill service, are now available in a complete line for all general machinery uses, according to an announcement of the Gatke Corporation, 228 N. La Salle Street, Chicago.

The bearings are composed of a special textile base impregnated with synthetic resins, moulded under high pressures,



and manufactured in all shapes and sizes. They are moulded of three basically different materials for various service. Each of these three materials, known individually as Hydrotex, Lubritex and Grafitex, has an extremely high tensile and sheering strength and a tremendous pressure resistance, although the weight is but one-seventh that of bronze bearings.

Hydrotex bearings are recommended wherever bearings run in water or where water is available for lubrication; Lubritex bearings are designed for equipment that is oil lubricated; while Grafitex is self-lubricating and especially made for slow moving machinery, where dirt and grit are encountered or where lubrication is neglected.

These bearings have a low coefficient of friction and are not affected by ordinary acids, chemicals, solvents, or salt water, or softened by oils or greases.

◆ Electric Welding Process

A new development in arc welding, particularly suited to the joining of heavy plates, has been announced by the Metal & Thermit Corporation, 120 Broadway, New York City.

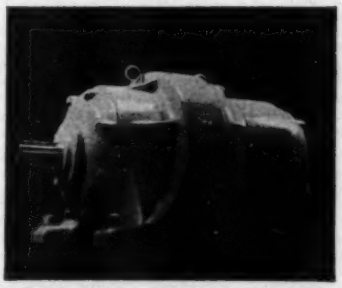
The new process, known as Murex Straight Gap Welding, does away with all need for veeing or grooving of plate

edges. Plates may be used just as they come from the mill. Greater welding speed, as well as appreciable reductions in cost are claimed. In fact, the developers of the process state that it cuts welding time in half, and, by eliminating all preparatory work and reducing the quantity of weld metal required, achieves real economy in welding heavy plates.

Literature may be had from the Metal & Thermit Corp.

◆ New Type Geared Motor

The U. S. Electrical Manufacturing Company, Los Angeles, Calif., has announced the development of a new product known as the U. S. Syncrogear Motor. It provides an electro-mechanical power conversion that commonly transforms the relatively high speed of



the electrical unit to the low speed required for operating the driven machine, or it may be geared for over-speeds. Units are furnished for any speeds from 2 r.p.m. to 10,000 r.p.m.

In brief, the Syncrogear Motor is a self-contained, single-base, geared transmission, foundationed on the heavy gear pedestal base. This construction minimizes cantilever stresses form overhanging gears by a short train structure. All torsional stresses are converged toward a center where the pyramidal gear pedestal base supports the entire unit.

The design does not permit the high speed gears to be submerged in the reservoir of oil, thus preventing the usual resistance, heat, and foaming caused by high speed churning of the lubricant.

◆ Automatic and Continuous Beating Process

An automatic and continuous beating process for dry pulps or old papers has been announced by the American Paper Machinery and Engineering Works, Inc., Glens Falls, N. Y. This process utilizes a continuous beater and chest combination; a regulator for control of consistency, color, clay, starch, size, alum, etc.; and a hydrator and pump.

The combined beater and chest, according to claims of the manufacturer, does the work usually performed by a shredder without tearing the fibers or producing fish eyes; removes dirt by screening, floatation, settling, and with a string and rag remover; and, in addition, continuously beats the pulp or old papers while agitating and screening it through plates with perforations as small as one-eighth inch.

The regulator for consistency and chemical ingredients consists of a complete stuff regulating and proportioning system which proportions color, size, clay, alum, etc., according to consistency regulation. It has such refinements as a reversing regulator motor operated by mercury vacuum tube switches, anti-hunting consistency regulating valve, uniform quantity control valve, and a graduated stuff control valve.

The hydrator, described in the August 1932 issue of THE PAPER INDUSTRY, receives the stock from the continuous beater, and after treating it, pumps it to the stuff box of the paper machine.

In starting the system, water and chemicals passing through the regulator are fed into the beater until it is half full. The pulp or paper stocks in proper proportion by weight are then added, and the process continued automatically. A recording liquid level gauge serves as a guide for the feeding of the pulp or paper stocks, while the regulator automatically proportions the water and chemical ingredients. The stream of stock, flowing through the regulator after passing through the small perforations of the continuous beater screen, is passed through the hydrator for final treatment previous to fabrication.

◆ K-Fin Bentube Heater

The Griscom-Russell Company has just announced a new indirect heating surface to be known as the K-Fin Bentube Heater, for use in heating and ventilating, air conditioning and cooling systems.

This apparatus employs patented K-Fin Tubing which has been used for many years in a variety of heat transfer apparatus and systems. The K-Fins composing the extended surface of this tubing are attached by a mechanical process which provides a continuous metallic contact between fins and tubes. The resulting bond is complete and permanent without requiring the use of solder or tinning. The construction is therefore suitable for high temperatures, and is adapted to practically any kind of material for special requirements.

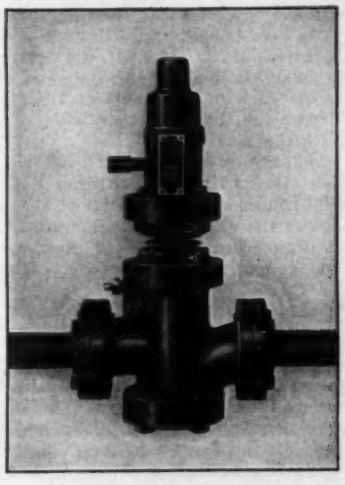
An additional distinctive feature claimed for the K-Fin Bentube Heater is the use of initially bowed tubes which accentuate their curvature on increase of temperature. Each tube is free to expand and change its curvature independently of all other tubes without the possibility of binding or interference.

These units are distributed exclusively through Hitchen Engineering Co., Inc., 155 East 44th Street, New York City, from whom further information and performance data can be obtained upon request.

◆ Brown Area Flow Meter

In addition to its standard line of electrical and mechanical flow meters, The Brown Instrument Co., Philadelphia, Pa. has developed and is now manufacturing another type of flow meter. This new meter, the area flow meter, is of the constant head, variable orifice type used for measuring the flow of fluids. The head, or pressure drop across the orifice is held constant while the size of the orifice opening is varied.

The inductance bridge principle is employed in this design to transfer the



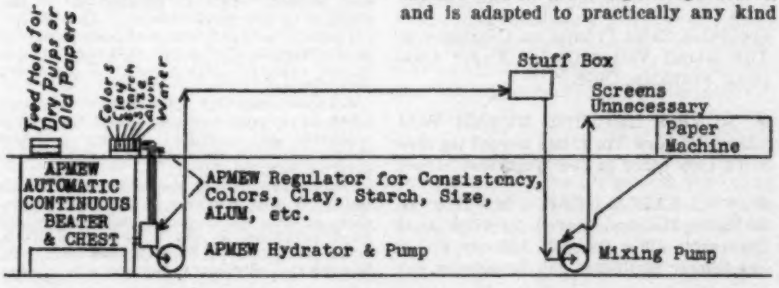
motion of the meter body piston to a recording or indicating meter. Transferring this motion electrically eliminates stuffing boxes, links, levers, etc.

The simplicity of design and construction of this new meter makes it applicable for measuring the flow of many different fluids under various operating conditions.

◆ Pressure Control Valve

Northern Equipment Co., Erie, Pa., announces a new design of differential pressure control valve known as the Copes Type SS-2. This new valve is an improved design of the Copes Type SS Valve.

Improvements in the internal construction of the valve permit the valve throttling higher pressure drops than in the earlier design, without chatter or unbalance. Internal parts have also been simplified and made much more rugged.


Feed Hole for Dry Pulps or Old Papers
Colors Clay Starch Size Alum Water
Stuff Box
Screens Unnecessary
Paper Machine
APMEW AUTOMATIC CONTINUOUS BEATER & CHEST
APMEW Regulator for Consistency, Colors, Clay, Starch, Size, ALUM, etc.
APMEW Hydrator & Pump
Mixing Pump

◆ Ross Gets U. S. Rights to Delthirna Process

Arrangements have been completed whereby the J. O. Ross Engineering Corporation will have the exclusive sales rights for the Delthirna Sizing Process throughout the United States.

Delthirna Plants are of simple construction and embody a principle that assures minimum maintenance and operating expense. Because there are no moving parts except the small fractional horsepower pump, and nothing to cause corrosion, the life of a Delthirna plant proves as long as that of the mill itself. The method of mixing basic materials is unique and results in substantial savings in material and labor costs as well as complete insurance against waste and deterioration.

The success of the Delthirna System abroad is well known and the thirty installations which have been made on this continent during the short time it has been available to the mills here, assures an even greater success in the United States.

This arrangement is of real importance to the paper industry since it makes available the experience and facilities that have been so long associated with the sale of other Ross equipment.

The Ross Corporation will have the cooperation of C. H. Kent, formerly of Mansfield, Bolton & Kent, Inc., and now associated with the American Delthirna Corporation, having supervision of all Delthirna activities.

Complete information and service in connection with the Delthirna System will henceforth be available through each of the J. O. Ross Engineering Corporation offices located in New York, Chicago and Portland, Oregon.

◆ Eaton-Dikeman Acquires Holly Glen Paper Mills

The Holly Glen Paper Mills near Carlisle, Pa., have been taken over by the Eaton-Dikeman Company. The mills were owned by James M. Miller, and had been idle for about ten years.

The Eaton-Dikeman Company had its plant at Lee, Mass., destroyed by fire last winter. The company will immediately equip the Holly Glen mills for operation and will move its entire plant to the new location.

◆ Divisional Superintendents Meetings

The Northern New York Division of the American Pulp and Paper Mill Superintendents held its spring meeting at Niagara Falls May 6. Interesting papers on the program included: "Stonite Rolls," by E. L. Tewksberry of Store-Woodward, Inc.; "Value of Laboratory Test to Superintendent," Dr. H. S. Bristol, International Paper Co.; "Modernize for Profit," by W. J. O'Brien, O'Brien Steam Specialty Co.; "Advance Temperature Control of Paper Drying," by Avery Stanton, Mason Regulator Co. The members were taken on a trip to the Niagara Wire Weaving Co., Niagara Falls, Ont., where an interesting talk on "New Developments in Wire Weaving" was given by E. J. Buell, Manager.

The spring meeting for the superintendents of the Pennsylvania-New Jersey Division and the April meeting of the Delaware Valley Section of the Technical Section of the Pulp & Paper Industry were held jointly April 22 at the Benjamin Franklin Hotel, Philadelphia. Some of the papers delivered were: "Recent Developments in Size," by Ralph Kumler; "Optical Characteristics of Paper," by E. S. Bissell; "Rubber Rolls, Their Use and Abuse," by W. E. Brown; "The McDonnell Fourdrinier," by Mr. Peterson; "Paper as Viewed by the Engraver," by Halver T. Sorenson; "Troubles of the Ink Maker with Paper," by J. Frank Carey; "Co-ordination of Technical and Practical Men," by E. C. Gildenzopf and G. E. Landt.

◆ Boyle Made Superintendent of Miami Valley Coated Paper Co.

J. W. Boyle has been appointed general superintendent of the Miami Valley Coated Paper Co., Franklin, Ohio. He had formerly been employed by the company as chemist.

Mr. Boyle received his early paper mill training with several old, established companies in Scotland. He also points to a very successful record with several mills in Canada and this country.

◆ THE AMERICAN Manganese Steel Company, Chicago Heights, Ill., announces that on February 15, this year, a contract between that company and F. A. Fahrenwald was terminated by mutual agreement. Under the arrangement now existing, AMSCO retains the right to use certain patents issued and pending, while the company has granted Mr. Fahrenwald the exclusive use of its registered trade-name "Fahralloy." By this change, it is the company's intention to market Nickel-Chromium Alloys made and sold by it, under the trade-name Amsco Alloys.

◆ Gair Personnel Changes

F. C. Becker and W. C. Flint have resigned as general manager and general sales manager of the Container Division of the Robert Gair Co., Inc.

R. H. Bursch has been appointed general manager of the Container and Boxboard Divisions with Lorin Miller, formerly manager of the Quincy Division as assistant general manager. Felix F. Doll has been appointed general manager of the Folding Carton Division.

◆ ROGER WOOD for the past nine years head of the Roger Wood Industries of Lafayette, Indiana, has been appointed Sales Promotion Counselor of The Miami Valley Coated Paper Company, Franklin, Ohio.

◆ MORRIS MACHINE WORKS, Baldwinsville, New York, has moved its New York City office to 254 West 31st Street.

◆ THE EARLE GEAR & Machine Co., Philadelphia, has moved its New York City sales office from 95 Liberty St., to the Singer Building, 149 Broadway.

◆ New Catalogues and Publications

Crane Company, Chicago—Two new bulletins for use in direct mail campaigns have been received from this company. One bulletin "Born of Retrenchment" deals with waste, with particular reference to piping and valves. The second bulletin "After 3 Years of Starvation Maintenance" explains a practical method for use in determining whether or not the piping equipment of a plant is as efficient as it should be.

Jeffrey Manufacturing Co., Columbus, O.—A handy folder, No. 558, just issued is devoted to Jeffrey Triple "E" Rivetless Chains. Parts are illustrated and the outstanding features of the chain discussed, together with suggestions of its adaptability.

Leeds & Northrup Company, Philadelphia—"Telemetering and Totalizing Station Loads" is the title of bulletin No. 874. This bulletin discusses means for providing the load dispatcher of an electric power system with continuous information on load conditions throughout the system, to facilitate load distribution in ordinary conditions, and to aid in control of emergencies. It describes apparatus for local recording of the outputs of generating units, stations and tie lines, for transmitting the records to the load dispatcher's office, and for combining them into the total for the system.

Metropolitan Life Ins. Co., New York City—A new report issued by the Policyholders Service Bureau of this company is entitled "Employee Handbooks." The material in this report is based on a review of selected manuals used by many companies to acquaint their employees with the rules and regulations of the office, store or factory. Many companies have found such booklets, when properly planned, to be of distinct value in improving and preserving relations between management and employees. Copies are available to personnel officers and other executives interested in this subject.

Stebbins Engineering & Mfg. Co., Watertown, N. Y.—A six-page pamphlet designated as bulletin No. 1, has been issued by this company. It describes the specialized character of Stebbins service in the lining of acid, alkali and corrosion resisting equipment. The background of the present organization is also emphasized.

BOOKS

Latex and Its Industrial Applications is the title of a recently published and most comprehensive bibliographical work of Mr. Frederick Marchionna. It not only covers the literature, but the patent development as well. The entire work of over 1,000 pages is arranged in chapters to facilitate the search for any particular subject, the chapters progressing from anatomical and physiological abstracts to and through abstracts covering the planting and cultivation of rubber, collecting and extracting latex, preservation of latex and rubber, behavior and characteristics of latex, coagulation of latex, preparation of rubber, direct use of latex in industry, artificial latex, electrodeposition of rubber, and the structure of rubber.

The author has arranged the abstracts of the literature after the patents for each subject, since as pointed out in the preface of his work, some of the technical articles are criticisms of certain patent developments, or reports of investigations on the value of certain patented processes or machines.

Of approximately 2,500 abstracts nearly 1,900 cover patents and over 600 cover scientific or technical papers. Among these abstracts are numerous citations to latex in papermaking.

This work should prove of inestimable value to any research worker, technologist, or any other individual who might have occasion to use a reference work. It is published by The Rubber Age Publishing Co. of New York.

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Symptoms of Bad Boiler Water

Impure water is the cause, and often the unsuspected cause, of endless boiler room troubles. Sometimes it may require a chemist to locate the cause and find a remedy; it does not require much effort or knowledge to become suspicious of it. There are many signs to cast suspicion upon the water. Gradually increasing stack temperatures; continual boiler tube failures; decreasing values for "pounds of water per pound of coal"; the inability to operate at high evaporation rates because of priming or foaming; debris carried over with the steam to cause unbalancing of turbine rotors, or scored engine cylinders; clogging of steam separators and traps, etc.; wet steam; corroded superheaters are some of the things that point a damning finger at impure water or improper water treatment.

Look at your cost sheet and see how often tubes must be turbined to remove scale. Check up and see how often units must be taken out of service for washing down. See if your boiler capacity is radically curtailed at certain seasons of the year because of foaming or priming. Investigate the water.

◆ Lubricants Are Not Rust Preventives

Where it is necessary to shut down equipment for any considerable length of time, there is a tendency to forget that this same equipment must be started up again at some future date and that rust and corrosion may work havoc with the metal unless precautions are taken to prevent it. A suitable rust preventive should, therefore, be applied to all parts which are susceptible to attack by moisture, corrosive fumes, liquids, etc. If this precaution is not taken it may be found that the machinery is irreparably damaged when the time comes to start up; or it may be found that some parts have been ruined so that the equipment cannot be started up without ordering new parts. In any case, the application of rust preventive material is a good investment.

The practice of covering bright steel parts with lubricating oil is far too prevalent. Lubricating oil is not a rust preventive. Lubricating oils have no inhibitive properties. In fact, many lubricating oils are quite corrosive under the influence of oxygen. Some of the more common materials, such as vaseline, linseed oil and petrolatum are unsuited for use as rust preventives since they are neither rust inhibitive, tenacious or nonporous. The difficulties are increased, of course, where high humidity and high temperature exist, since both accelerate corrosion.

All bright steel surfaces should be protected against rust if the shut down is to be prolonged. The rust preventive should be of the non-drying type, which may be applied readily and in generous quantities. The steel should be thoroughly cleaned before the rust preventive is applied. In the case of dies and delicate parts, a preventive of the drying variety is preferable, since it will dry hard and non-porous, forming an impervious coating which can be readily removed, when the times arrives, by means of a solvent. First class rust preventives are expensive, but they are cheap at the price, and the more valuable the equipment, the more extensive the surface to be protected and the longer the period of shut down, the more important it becomes to do a good job with a good rust preventive.

◆ Plant Hazards Should Be Checked

Inherent hazards abound in many power plants. Absence of emergency exits; insufficient room between units; lack of railings, barriers and safeguards and insufficient room for the proper execution of repairs; inadequate illumination; absence of overspeed devices and electrically operated or chain-operated valves are typical instances of inherent hazards due to oversights in the design or at the time of installation or both.

Many needless accidents, such as sprained ankles, fractured fingers, strained and wrenched backs, occur because of the wrong choice of flooring. There are places where either of them may create a hazard due to moisture or sliding, or because they constitute an obstruction. Steel flooring with the proper tread frequently eliminates certain classes of accidents.

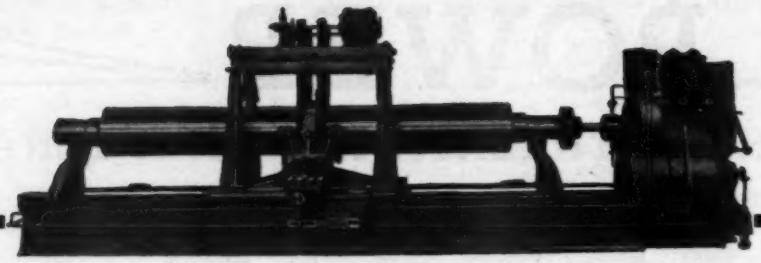
Inherent hazards are frequently built into a power plant because the designer has in mind permanent, routine operating conditions and fails to take into consideration the emergencies and repairs that must be made. This is especially true where induced draft and economizers are used and where, in too many instances, no provision has been made whatsoever for quick replacements or safe working conditions. The steam piping of many plants is laid out with utter disregard of adequate drainage, overburdening the steam separators, increasing the danger from slugs of water being carried over into engine cylinders. The same is true of some condensers where danger of water being drawn up into the cylinders is always present when starting up.

The portable electric lamp cord may be truly looked upon as an inherent hazard. It is particularly deadly around the power plant, where steel structures and ash and moisture together with a ramification of water pipes constitutes a permanent and low-resistance earth or ground. Men become covered with grime, such as coal dust, mixed with perspiration so that their contact resistance is low. Under such circumstances, 110 v. is more than enough to kill. Notwithstanding the fact that danger of this cord is known, dozens of men are killed each year.

Every power plant has its permanent hazards, that exist only because somebody has not had the initiative or the alertness to abolish them. What is dangerous is expensive. The man who goes through his plant looking for these dangers will find them.

◆ THE PAINTING OF new galvanized iron may give trouble due to the paint flaking from the surface, regardless of the quality used. This trouble is usually overcome in practice by allowing the galvanizing to weather for six months or a year before it is painted. However, if it is necessary to paint new galvanized surfaces, good results will be obtained by first washing the surface with a copper sulphate solution. Although a good primer is recommended for galvanized surfaces, this is not as important as with ordinary structural steel, as the coating of zinc will act as a rust-preventive coating on the surface. Any good finish paint is suitable for galvanized iron.

◆ IT HAS BEEN the common experience of those using fuel oil for firing boilers that the refractories of the furnace fail because of spalling rather than from slagging, whereas slagging is the more common trouble with furnaces fired with powdered coal. The relatively small amount of slagging in oil-fired furnaces is to be expected because the ash content of fuel oil is less than one-tenth of one per cent, whereas that of the coal may be from 8 to 20 per cent; there has been, however, no proved explanation of the very common breaking up of the refractory walls by spalling, although that of strains caused by temperature variation is reasonable.



"more than 70 different Paper Mills - - - couldn't be mistaken in their judgment"

The Lobdell Roll Grinding Machine is the culmination of 50 Years' Experience in the designing and building of Calender Stacks, Rolls and Roll Grinding Machinery. This machine is not only accurate, compact and of pleasing appearance,—but it possesses two features which are "EXCLUSIVELY LOBDELL," viz: THE AUTOMATIC CROWNING DEVICE (the only device which produces the exact pre-determined Roll Crown, by a simple setting of a micrometer scale,—and PROVISION FOR LEVELING THE BED (to compensate for wear).

Other features of this machine are: Direct-connected enclosed geared driving head. Complete automatic lubrication throughout. Absolute protection of "all" moving parts.

"Literature sent upon request"

Other LOBDELL Products
Complete Calender Stacks,—"Puraloy" Chilled Iron Calender Rolls,—Improved Roll Caliper

LOBDELL
CAR WHEEL COMPANY
97 Years in Business
WILMINGTON·DELAWARE

LONGEVITY--

"Long Duration of Life"

TENAX FELTS are renowned for long life
TENAX FELTS cost less in the long run
TENAX FELTS are styled to remove water faster
TENAX FELTS are abreast of the current times

A Trial Will Convince You

Non-Users Are the Losers

LOCKPORT FELT COMPANY

NEWFANE, NEW YORK
Alan C. Dunham, Pac. Coast Rep., Portland, Oregon

National Paperboard Association Submits Plan to President

THE members of the National Paperboard Association, comprising over 90 per cent in numbers and volume of paperboard manufacturers, have approved a plan, hereafter set forth, and have submitted it to the President of the United States.

The paperboard industry is a large and important one, employing approximately 50,000 persons. During the year 1932, and so far this year, it has operated at about 50 per cent capacity. (This statement is based upon complete and accurate statistics, which have been audited.)

Prices are demoralized to an extent which precludes profitable operation and this condition has forced economies which have reduced wages and the number employed in harmful degree.

The members of this industry favor a six-hour day in this emergency. They favor the payment of adequate wages. They favor the elimination of, and a curb upon, the unsound and unfair in merchandising practices and prices, which bring chaos to business and a reduction in employment and wages.

Notwithstanding the above, the members of this industry oppose government regulations of the hours of labor, of wages and production. It is the opinion of the members of this industry that before the United States Government embark upon the regulation of business, other and probably safer remedies should be attempted.

Before industry is condemned, and it is deprived of all freedom of action, it should be remembered that under laws now being proposed, industry will be required to do those things which, under existing laws, it has been refused the privilege to do voluntary. The many should not be penalized for the sins of the few, over whom all control has been denied to industry.

The members of this industry believe that if business will be permitted to act voluntarily, hours of labor will be reduced employment will be increased, adequate wages will be paid, and industry stabilization—all to the public good—can be secured.

We recognize that any industry stabilization plan, which has the power to effect the necessary cures, includes the power to abuse; that, therefore, for the protection of the public, governmental supervision is necessary. On the other hand, we believe that such governmental supervision will be better than direct regulation through statutory regulation of hours of labor, wages, production and other business details. It is our opinion that the government cannot embark upon such program of regulation without it developing new abuses, the curing of which will call for continued additional governmental control until the full license system will be in force and all liberty of the individual will be lost.

The members of this industry therefore respectfully request the enactment of a law that during the period of emergency (as the same may be declared by the President) the operations of the Sherman Anti-Trust Law shall be suspended with respect to any plan submitted to and approved by the President, acting through a bureau of representatives to be designated, which shall be responsible to the President, provided such plan shall have the approval of at least 75 per cent in numbers and volume of the particular industry; that in case any such plan is so approved, it shall be binding upon and enforceable against all members of the industry; that the approving body may withdraw its approval at any time if operations under the plan shall be deemed to produce results harmful to the public welfare; that any such plan shall, as a condition to approval, contain therein provisions, which are fair and reasonable, covering hours of labor, rates of pay and other protective features as may be necessary to safeguard the interest of the public.

The Plan

As illustrative of the above, this industry, if legislation such as the above be enacted, will submit a plan which will, among other things, include the following:

A Six-Hour Day—This would mean four 6-hour shifts on paper machines for 24 hours of continuous operation, in place

Turning Pipe Into GOLD

WE don't mean alchemy or black magic—we mean *buying the one pipe* that will help turn your paper products into the gold of profits. ● That pipe, as you may have experienced, is Armco Spiral Welded Pipe. If ever a pipe were made to order for paper and pulp mills, this pipe is. It is as strong as good iron or steel and a unique stiffening helical weld can make pipe. Yet it handles easily. Your pipe crew can run footage fast and surely. And you will thank its sheer-smooth inner surface for steady flow and reduced power costs. ● Use Armco Spiral Welded Pipe for stock lines, white water lines, waste, water supply, and exhaust steam lines. Watch it put the damper on excessive piping costs. Remember, you can order it in small quantities or large from our quick-delivery stocks. Just send your inquiry to our nearest office.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices: Middletown, Ohio

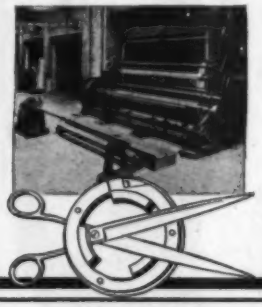
DISTRICT OFFICES: *Boston . Chicago . Cleveland Detroit . Middletown . New York . Philadelphia Pittsburgh . St. Louis . San Francisco*

ARMCO

ARMCO SPIRAL WELDED PIPE

"MADE TO ORDER FOR PAPER MILLS"

LANGSTON SLITTERS



FOR clean, square-edged, tightly wound rolls, Langston Slitters are unequaled. The Shear-Cut parts the paper cleanly—instead of *crushing* it. Ask for details.

Samuel M. Langston Co., Camden, N. J.

ROLLWAY BEARING COMPANY INCORPORATED
SYRACUSE NEW YORK
ROLLWAY CYLINDRICAL ROLLER BEARINGS

No Box Is Stronger Than Its Corners

Know Your Box Before It Is Completed—Filled—Shipped and Stacked

Does your tape let go at the bond or does the texture of the woven fabric permit the laminations to separate and the box to open at the corners?

The **Perkins Tensile Tester**

accommodates combined specimens of corrugated board and tape.
The breaking point recorded on the gauge indicates that the ultimate strength of the tape has been passed.

B. F. PERKINS & SON, Inc.
Holyoke, Mass.

WANTED—Tour Boss for mill in central territory making folding boards and high grade specialties. Apply giving age, experience and references to Box 209, THE PAPER INDUSTRY.

It Pays to Advertise
OPPORTUNITIES
in This
Opportunity Section

CARTHAGE MACHINE CO.
Carthage, New York
» » »
Machinery for Ground Wood and Chemical Pulp

Lessons in Paper Making

By **Harry Williamson**

One of the greatest funds of information on paper making ever published for the mill man.

Part I contains the first twelve lessons and two separate articles—A Problem in Head Box Control and The Degree of Hydration. Price 50c.

Part II contains fourteen lessons and one separate article—Safety Practice in Machine Room. Price 50c.

Practical Helps for the Mill Man

A 48-page pamphlet made up of practical helps, many of which have meant considerable savings in paper and pulp mills. Of tremendous value to the practical man. Price 50c.

THE PAPER INDUSTRY
333 N. Michigan Ave. CHICAGO, ILL.

of three 8-hour and two 12-hour shifts now prevailing. It is estimated that this will put 12,000 to 15,000 more men to work in this industry.

Adequate Wages—We will agree that this wage for six hours shall not be less than the 1929 wage for eight hours, adjusted—plus or minus—to the cost of living in 1929 as compared with the cost of living at any time hereafter prevailing, all as may be necessary so that the wage shall be proportionate and the purchasing power equalled to that prevailing in 1929.

This will increase the cost of production. It is assumed the government will take action as appropriate to protect industries in this country from competition from foreign countries.

Price Limitation—A limitation on prices as may be necessary to prevent unreasonable profits and unfairness to the public.

Stabilization—The plan will not include agreements as to prices or limitations upon production. Allocation of customers, protection of existing volume or trade position will not be included. The plan will, however, contain provisions which will operate as a curb upon demoralizing price cuts and other practices now recognized as damaging to industries and to public welfare.

Through recognition of, and adherence to, the principle that each member of the industry should control excess capacity, which is in proportion to the industry's excess capacity, individual operations of capacity in excess of the industry per cent will be subject to a progressive tax at an amount per ton to be hereafter determined. The amount of this tax will be so fixed as to operate as a deterrent to volume seeking through unsound price concessions, but will not be so large as to preclude full and free competition under normal, healthy merchandising policies and prices. Penalties in the form of a tax will be applied as protective of wage levels and hours of labor.

The paper-making machines are the units of production in this industry; all are known and the rated capacities of each will be the factors upon which the tax will be measured.

Administration of Tax Fund—This tax will be paid to trustees, and its collection will be enforceable by the trustees. These trustees shall be persons approved by the Government. Tentatively it is proposed that the industry shall appoint one; the Secretary of Labor shall appoint one, and the two so appointed shall choose the third. Broad discretion shall be given the trustees as to the use of any fund so created. One purpose would be to use the fund as an unemployment fund; another purpose—all in the discretion of the trustees—would be the payment of rental for paperboard mills and properties, this by way of relieving the pressure of excess capacity and aiding through the depression, companies which are facing operating difficulties. In case an operating mill should be so leased or carried by this fund, it is proposed that such taking over should be conditional upon the absorption by the industry of the labor of any property so shut down. This would permit of some control of capacity and the relieving of the pressure upon the industry of excess capacity, without at the same time giving the industry power to create capacity shortage. By such use, it is believed that the fund would operate to maintain employment and thus reduce the need of its use for unemployment.

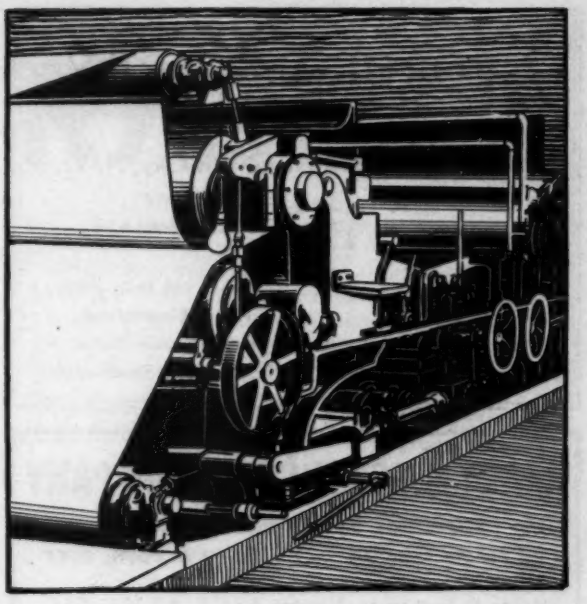
It is appreciated that governmental supervision of operations under any plan is essential in order that its true effect and fairness in operation can be known. This industry will welcome such supervision.

Further details will be included as may be necessary and deemed proper for the benefit of capital invested, those dependent for their livelihood upon the industry, and the public.

The foregoing is not intended to cover details but to set forth the broad outline of the plan proposed.

❖ ❖ ❖

◆ THE NEW office building of the Worthington Pump and Machinery Corp., situated adjacent to the plant at Harrison, N. J., was opened May 1. The general and executive offices have been moved from New York City to the new location for better co-ordination of manufacturing and sales. Local sales office will remain at 2 Park Avenue, New York.



Felts that Live to a "Ripe Old Age"...

Any felt that will remove water faster and outlast the general run of felts merits your consideration. If you can reduce your felt cost you can add to your profits. A dollar saved is a dollar earned . . . and in the course of the year's production Orr Felts will save many dollars.

Highly specialized manufacturing skill, years of experience, knowledge of mill problems and a real desire to lead the field have given Orr Felts a quality and degree of excellence that stand back of their claim to superiority.

The Orr Felt and Blanket Co.

Piqua, Ohio

ORR FELTS

GEORGE F. HARDY

Consulting Engineer

305-309 Broadway, New York City, N. Y.

Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.

Consultation	Paper and Pulp Mills
Reports	Hydro-Electric and
Valuations	Steam Power Plants
Estimates	Plans and Specifications

VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.

Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS

Power Specialists
Monadnock Bldg., Chicago

PULP MILL MACH'Y ◆ FINISHING ROOM MACH'Y
◆ FRICTION CLUTCHES ◆

The MOORE & WHITE CO.
PHILADELPHIA, PA.
N. PHILA. STA. PENNA. R.R.
PAPER MILL MACHINERY

HARDY S. FERGUSON & COMPANY

CONSULTING ENGINEERS

200 FIFTH AVENUE **NEW YORK CITY**

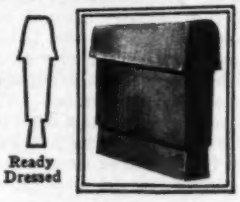
Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*
J. Wallace Tower—*Member A.S.C.E. A.S.M.E.*

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of { PULP AND PAPER MILLS; AND OTHER INDUSTRIAL PLANTS; STEAM AND HYDRO-ELECTRIC POWER PLANTS; DAMS AND OTHER HYDRAULIC STRUCTURES

"READY DRESSED" MILL COGS

LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL



Ready Dressed — Blank Head

WE MAKE ANY STYLE OR SIZE WANTED

WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., So. Bend, Ind.

Outstanding Features of Apmew Paper Stuff Hydrator

1. Produces Cleaner, Stronger and Better Paper.
2. Produces Better Paper with **80% SAVING IN POWER.**
3. Includes all the best scientific principles of Beater, Jordan, Rod Mill, Ball Mill, Centrifugal Separator, and Pump.
4. Takes the place of Jordans, and sometimes Beaters, Paper Machine Screens, Centrifugal Separators, and Pump.
5. Built in sizes having capacity up to 75 tons daily.
6. Hydrates by squeezing the water into the fibres, between rolls under tremendous pressure, without cutting the fibres short.
7. Hydrates the fibres under pressure and vacuum with all degrees of pressure between great pressure and vacuum.
8. Reduces the shiners and fibre bundles to fibres.
9. Pulverizes the dirt to small particles similar to a pigment color.
10. Power savings repay every few months the cost of Hydrator and the cost of installing it.
11. Work of Hydrator is easily controlled as desired by three means, namely: 1, speed; 2, consistency; and 3, quantity.
12. Can be driven by low cost motor—1800 RPM variable speed slip ring.

Write for information:

AMERICAN PAPER MACHINERY and ENGINEERING WORKS, Inc.
GLENS FALLS, NEW YORK

Canadian Representative: **Paper Mill Equipment Ltd., 913 Drummond Bldg., Montreal, P. Q.**

PULP PERKINS-GOODWIN CO. PAPER

Established 1846
551 FIFTH AVENUE, NEW YORK

PITTSBURGH PIPING

Manufacturers and Contractors

WE ARE fully equipped to supply fabricated materials and to install complete piping systems for Electric Power Stations, Blast Furnaces, Steel Mills, Coke Works, and Industrial Plants of every description—backed by an experience of more than a quarter century.

P&E.C.D. WHEN YOU THINK OF PIPING THINK OF PITTSBURGH PIPING

PITTSBURGH PIPING AND EQUIPMENT CO.
43rd Street & A. V. R. R.
PITTSBURGH, PENNA.

NEW YORK
220 Broadway
CHICAGO
Peoples Gas Bldg.
BOSTON
10 High St.
CLEVELAND
Ulmer Bldg.
HOUGHTON, MICH.
Dee Bldg.
INDIANAPOLIS
Occidental Bldg.
DETROIT
General Motors Bldg.

The Paper Industry Safety Contest

July 1, 1932, to June 30, 1933
Scores as of March 31, 1933
17 Mills Still in Race

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B	The Champion Coated Paper Co. Fraser Companies, Ltd.	Paper No. 1 Fraser Paper, Ltd.	Hamilton, Ohio Madawaska, Me.
GROUP C	St. Croix Paper Co.	Woodland	Maine
	Marinette & Menominee Paper Co.	Menominee	Michigan
	Cornell Wood Products Co.	Cornell	Wisconsin
	International Paper Co.	Livermore Falls	Maine
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	Consolidated Water Power & Paper Co.	Biron	Wisconsin
GROUP D	Port Huron Sulphite & Paper Co.	Sulphite	Port Huron, Mich.
	U. S. Gypsum Co.	No. Kansas City	Missouri
	Container Corp. of America	Carthage	Indiana
	International Paper Co.	Riley	Maine
	Hollingsworth & Whitney Co.	Albenaquis	Madison, Me.
	U. S. Gypsum Co.	Gypsum	Ohio

Division II—Remanufacturing

Kimberly-Clark Corp.	Atlas	Appleton, Wis.
Container Corp. of America	Natick	Massachusetts
Bemis Bro. Bag Co.	E. Pepperell	Massachusetts

IMPERFECT SCORES—Division I

	Key	Rank	Points Credit	Points Debit
GROUP A	PA- 2	1	975.856	
	PA-11	2	760.624	
	PA- 6	3	743.680	
	PA- 9	4	661.296	
	PA-12	5	538.496	
	PA-13	6	469.056	
	PA- 7	7	430.816	
	PA-14	8	392.224	
	PA- 8	9		1,762.288
	PA- 5	10		5,740.512
GROUP B	PA- 1	3	912.128	
	PB-21	4	881.536	
	PB- 5	5	804.016	
	PB-14	6	760.112	
	PB-18	7	711.520	
	PA- 3	8	664.228	
	PB-22	9	622.400	
	PB- 3	10	522.832	
	PB-20	11	350.704	
	PB-19	12	342.656	
	PC- 1	13		246.176
	PB-12	14		401.856
	PB- 6	15		478.672
	PB-15	16		712.976
	PB-13	17		741.888
	PA-10	18		2,766.512
	PB-17	19		3,140.688

DIVISION II

	RD- 1	4	673.824	
	RD- 3	5	508.608	
	RB- 3	6	488.816	
	RB- 1	7	477.920	
	RD- 6	8	463.808	
	RC- 1	9	388.096	
	RD- 7	10		78.224
	RC- 3	11		352.864
	RA- 1	12		501.616
	RB- 2	13		546.704

	Key	Rank	Points Credit	Points Debit
GROUP C	PC- 8	7	926.064	
	PC-20	8	924.304	
	PC-15	9	771.152	
	PB-16	10	759.856	
	PC-24	11	717.456	
	PD- 5	12	689.776	
	PB-10	13	565.344	
	PC- 9	14	510.480	
	PC- 6	15	439.152	
	PC-17	16	373.824	
	PC-19	17	373.488	
	PC-13	18	323.232	
	PC-14	19		120.144
	PD-11	20		155.984
	PC- 7	21		802.040
	PB- 9	22		1,161.664
	PC-22	23		1,397.632
	PC-10	24		5,265.728
	PC-18	25		7,550.672
GROUP D	PD-12	7	846.384	
	PD- 3	8	720.384	
	PC- 2	9	716.864	
	PD- 8	10	690.368	
	PD- 7	11	640.192	
	PC- 4	12	606.512	
	PD-14	13	39.056	
	PD-23	14		43.392
	PD-13	15		406.256
	PD-10	16		560.128
	PD-15	17		577.824
	PD- 1	18		587.040
	PC-21	19		979.520
	PD- 4	20		1,063.424
	PD-20	21		1,157.936
	PD- 9	22		5,368.320
	PD-21	23		11,625.200

Withdrawn: PA-4; PB-7 and 8; PC-5 and 16.
No March Report: PB-2; PC-25.
No February or March Report: PC-26.

◆ Hercules Powder Makes Safety Record

According to information published by the National Safety Council, the Hercules Powder Company, Wilmington, Delaware, made a remarkable safety record for the year 1932, this being the first time in its history that the company operated a year without a fatality or a permanent disability injury to an employee.

The frequency rate, approximately 3.00, was the lowest recorded by the company during the 20 years accident statistics have been kept. During 1932, the company operated at about 60 per cent capacity. Since 1925, lost-time injuries have been reduced 95 per cent.

RYERSON

IMMEDIATE STEEL FOR MAINTENANCE AND REPAIR

Whenever you need any steel or allied products for new work . . . maintenance . . . or repair, write, wire or 'phone the Ryerson Company. All materials are in stock for immediate shipment.

Bars, Shapes	Turnbuckles	Stainless Steel (Allegheny)
Structurals	Shafting	Babbitt Metal
Rails, Plates	Boiler Tubes	Ryertex Bearings
Sheets—Plain, Galv. & Corrugated	Boiler Fittings	Tool Steel
	Concrete Reinforcing	Floor Plates
Rivets, Bolts	Welding Rods	Safety Treads
Nails	Solder	Small Tools
Wire	Bar Iron	Machinery
Chain	Refined Iron	

Write for the Ryerson Stock List —the "key" to Immediate Steel.

JOSEPH T. RYERSON & SON INC.

Chicago Milwaukee St. Louis Cincinnati Detroit
Cleveland Buffalo Jersey City Philadelphia Boston

STEEL

ACTIVE ALKALI!

METSO

METSO

SODIUM METASILICATE[oo]

. . . IS the basic alkali that has filled the gap between caustic NaOH and the milder alkalies. A larger proportion of its alkali is available at an effective pH than in other alkaline salts.

Learn all about this new paper maker's chemical.

[oo]U. S. Pat. 1898707

PHILADELPHIA QUARTZ CO.

General Offices: 121 S. Third Street, Philadelphia
Chicago Office: 205 W. Wacker Drive

Sold in Canada by NATIONAL SILICATES LTD., Brantford, Ont.

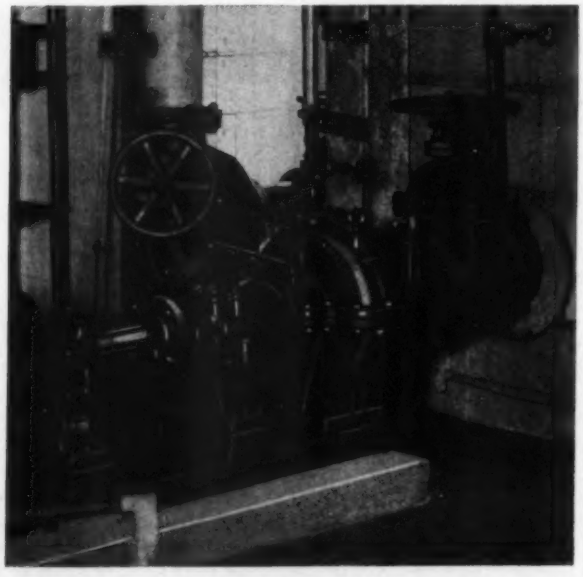
A formula for LOWER Pumping Costs

1. Call in a Buffalo representative.
2. Let him check over your pumps and make recommendations.
3. Check his performance figures with USERS of Buffalo Stock Pumps.
4. Install Buffalo Pumps when you are fully convinced that you'll save money!

This simple formula—if followed out—will lower the cost of pumping stock in a great many mills. Can you afford to do without a check-up of this kind—when it costs nothing and may save hundreds of dollars?

Our branch engineering offices are in all principal cities. Write for a consultation.

Buffalo Pumps, Inc.
213 Mortimer Street, Buffalo, New York
In Canada: Canada Pumps, Ltd., Kitchener, Ont.



"Buffalo" Non-Clogging High Consistency Stock Pumps

IMPORTANT NEWS

Visitors to the 14th annual convention of the American Pulp and Paper Mill Superintendents Association to be held in Green Bay, June 8, 9, 10, are going to see on exhibition, a machine that promises to revolutionize the manufacture of paper napkins. No more can be said about this great machine at this time. Full details, in the form of an official announcement will be made at the time of the convention. If you are planning to attend this event be sure to visit the Hudson-Sharp exhibit.

HUDSON-SHARP MACHINE CO.
GREEN BAY - - WISCONSIN

H·S MACHINE CO.

The TRADE MARK OF GOOD FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N.Y.

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

◆ Laboratory Beating and Making Test Paper Samples

The main purpose of the laboratory methods described is to determine numerically the difference in strength between pulps of different origin, and to establish numerically the strength characteristics of pulps of the same origin but digested under different conditions. In order to accomplish this, it is necessary to have a laboratory beater which will process small quantities of stock, which is easy to operate, and a sheet-forming machine which will give as large as possible a paper sheet and which is also simple to operate. The experimental beater developed was of the rotary type in which the rotor is provided with grinding or beating surfaces, as shown in Figure 1. This machine has been proven able to give

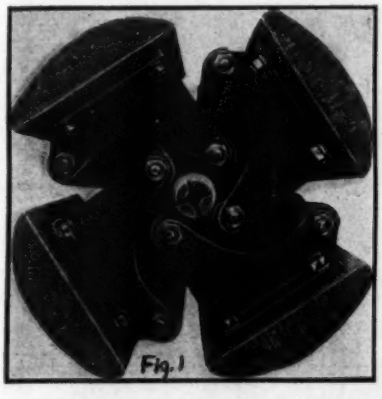


Fig. 1

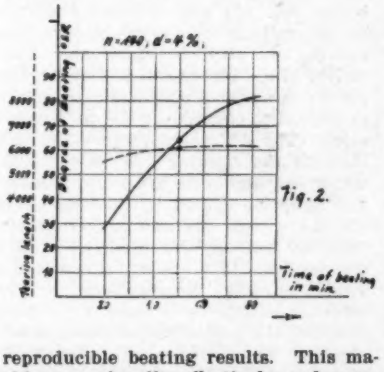


Fig. 2.

reproducible beating results. This machine can handle effectively and accurately samples of 100 to 1,000 grams (on the dry weight) in a density of five to ten per cent. A sample can be taken from the machine without stopping its operation. It requires only twenty to eighty minutes of operation to give samples of the required degree of beating. Numerous tests were made with this machine and photomicrographs were made of various types of pulp in various degrees of beating. Figure 2 shows an example of the work of the machine in which two curves are given, indicating the relation between the tearing length and the time of beating, and the degree of beating in degrees SR and the time of beating. The pulp in this case is a very easy bleaching pulp, which has been bleached very thoroughly and which has consequently a comparatively low strength and a low tearing length curve. The machine used in forming the

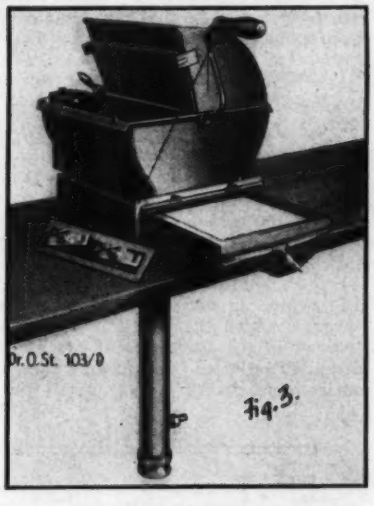


Fig. 3.

sheet is shown in Figure 3. The stock is fed in at the top in a funnel which is filled with water to a certain mark. The sheet is formed under suction and is then pressed and dried in the usual manner. G. Strecker and G. Kirchner. Wochenblatt fuer Papierfabrikation, volume 64, 1933, 77-81.

◆ Ammonium Alginate in Making Paperboard

Ammonium alginate, which is made from algin, a principal constituent of certain types of marine algae, is a mucilaginous substance soluble in water. It increases the strength of the paper fiber considerably, softening the same and aiding materially, much better than starch, in retaining the fillers used. It is claimed actually to penetrate the pulp fibers, surrounding the filler and actually gluing together the individual fibers in paperboard and cardboard. One pound of ammonium alginate replaces twelve pounds of starch as regards viscosity. When it is merely desired to increase the stiffness of the board, all of the starch need not be replaced by ammonium alginate, but merely a part. La Papeterie, volume 54, page 1122.

◆ Tearing Resistance in Pulp Testing

Pulps made from pinewood have often been found to possess maximum tearing resistance in the unbeaten state. The resistance does not increase with beating. The author believes this to be due to the nature of the digestion process in the case of unbleached sulphite pulp. Pinewood which has been digested by the Mitscherlich process gives a pulp which tends more to develop its maximum tearing resistance after slight hydration than Ritter-Kellner pulp. Careful investigation has however revealed no definite law regarding this phenomenon. Sulphate pulp commonly attains its maximum tearing strength at low degrees of beating. It is difficult to set up a rule for bleached sulphite pulp, since the maximum may be found at the start of the curve or after some beating has been done. The magnitude of the maximum tearing strength of various pulps is partially dependent on the length and the structure of the fibers. Figure (1) shows how the maximum tearing resistance of pulps, made from the same wood and according to the

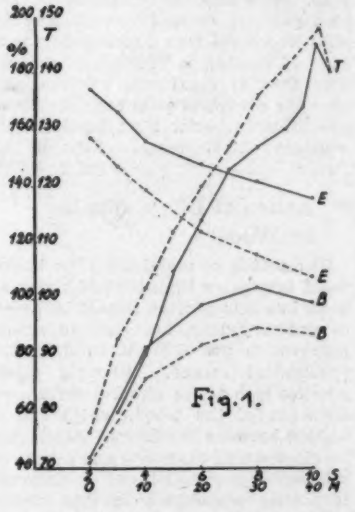


Fig. 1.

same digestion process, depends on the treatment that the stock receives during the digestion itself. The temperature curves are shown at (T), the tearing resistance curves at (E), the bursting strength curves at (B), while (S) represents the hours of cooking and (M) the minutes of beating. Viscosity experiments on ammoniacal copper oxide solutions of the pulps agreed with the

mechanical tests. Tests were also made to compare pinewood pulp with hemlock pulp, digested by the sulphite process. The results are shown in Figure (2), in which the top curve, designated by (A), refers to the tearing resistance of pinewood pulp and the curve (B) for hemlock pulp, while the corresponding bottom curves refer to the

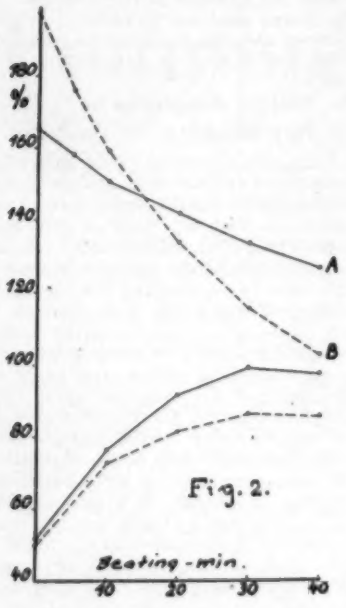


Fig. 2.

bursting strength of the two pulps, as these strength characteristics vary according to the time of beating. The bursting strength of pinewood pulp is considerably better than that of hemlock pulp. The tearing resistance of hemlock pulp, as compared with pinewood pulp, decreases very considerably as the time of beating is prolonged, and it is true that at maximum bursting pressure the pinewood pulp endures beating considerably better than hemlock pulp. Andreas J. Luettgen. Zellstoff und Papier, volume 12, pages 435 to 437.

◆ Action of Dilute Alkalies on Wood

The action of alkalies on the bark of wood is greater than that of water and heat, but this process cannot be applied to ordinary logs, but only to crooked logs which are difficult to debark by mechanical means. Strongly diluted alkalies also act to dissolve certain constituents of the wood, which are imbedded between the fibers. Particularly beechwood and pinewood and others containing large quantities of resinous matters can be softened in this manner. Combination of this softening action with thorough defibrination by mechanical pressure and without strong cutting or beating action gives brownish fibrous products when sodium hydroxide is employed as base. These products are useful in making pasteboard and cardboard. A product like straw pulp is obtained with beechwood, while a material suitable for making packing paper is obtained from pinewood. The yields are better and the quality improved as compared with the steamed mechanical wood process.

The use of alkali acetate is discussed as a preliminary step in treating wood for manufacture into sulphite pulp. Sodium hydroxide solution may be used for the same purpose. Another application of dilute alkali solution is in the combined alkali debarking of wood with the production of half-stuff or sulphite digestion. The quantity of alkali or alkali salt is so chosen and the other conditions, such as concentration, temperature and duration of treatment, are so controlled, that complete impregnation of the woody fibers with the alkali solution is secured. The chips, the wood being treated in this form, are then filled into a drum for mechanical removal of the bark, and the treated chips are subjected to the action of a strong spray of water to remove the last particles of bark. They are then ready for conversion into half-stuff or sulphite pulp. The action of alkali in obtaining the by-products, alkali acetate and acetic acid, is also discussed. Dr. Roland Runkel. Wochenblatt fuer Papierfabrikation, 1933, volume 64, pages 21 to 22.

◆ Recovering Waste From Purifiers

The purpose of the process is to recover immediately and automatically the waste fibers in the purifiers themselves by passing the wash waters through filtering devices. The pulp, that it is required to purify, is conducted into the interior of the main chamber (T) of a drum purifier through the pipe (C) which is pierced with holes (O) through which the pulp flows into the interior of the compartment (I) of the drum. The latter is perforated over its entire circumference and length with

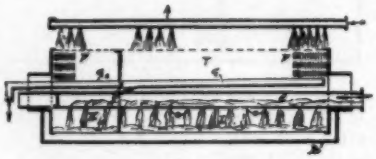


Fig. 1

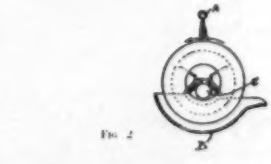


Fig. 2

numerous thin slots, arranged in the manner shown at (F). This drum is more or less vigorously shaken by a suitable mechanical device, which facilitates the passage of the pulp through the openings (F) while the impurities are retained. The pulp is collected in the trough (B). Water under pressure is sprayed on the perforated drum from the line (A), so that the perforations therein are cleaned. The wash water, which contains the impurities and a certain proportion of usable fibers, are directed through the passage (G) into the second compartment (II) which is separated from the first by the partition (P). In this second compartment, the wash waters are caused to pass over the slotted circumference of the drum and most of the valuable fibers in these waters are thus recovered and collected in the trough (B) along with the purified pulp in the first compartment (I). The second compartment (II) is likewise subjected to the action of spray water from (A). Marcel Thiry. French Patent No. 731,811.

◆ Beater-Disintegrator

This machine is particularly designed for treating old paper and waste from paper machines and the like for conversion into a pulp suitable for reuse in the manufacture of paperboard or paper.

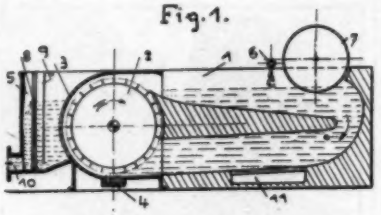


Fig. 1.

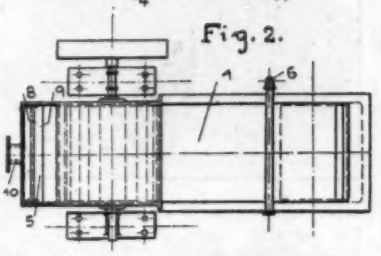


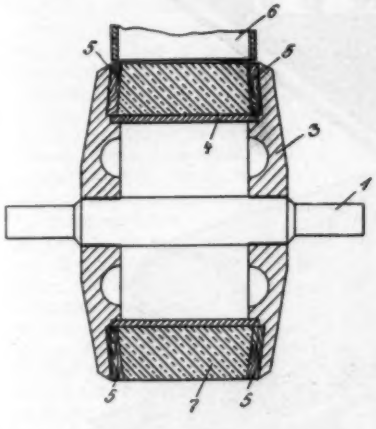
Fig. 2.

According to the diagram, the material to be treated is introduced continuously into the vat (1) at a point located between the beater roll (2) and the spray tube (6). Under the action of the hot water (preferably) added through the spray tube (6) and the wash drum (7), the material under treatment is soaked and disintegrated and carried along in the circulation produced by the rotation of the beater roll (2) in the indicated direction. It thus eventually reaches the beater roll (2) and is carried by the beater roll in the cells between the knives over the bedplate (4). The knives of the beater roll and of the bedplate can be made to contact in case it is desired to comminute the particles of stock. The disintegrated particles pass through the opening (3) in the hood under the action of hydraulic pressure and agitation caused by the rotation of the beater roll (2) and are eventually removed through the outlet (5), while the particles that are not properly disintegrated are thrown back by the beater roll into the trough (1). Inasmuch as the beater works continuously, stock of various degrees of disintegration is found in the machine. Repeated passage of the stock between the knives of the beater roll and the bedplate finally results in satisfactory comminution so that the particles can be removed

through the perforations in the hood. The weir (8) is provided to regulate the height of the liquid in the outlet (5). The wall (9) is provided to prevent formation of deposits of stock in the outlet (5). The stock finally leads through the opening (10). The part (11) is a sand-catcher. Robert J. C. Frey. French Patent No. 737,139.

◆ Annular-Shaped Pulpstone

The cross-section view shows an annular shaped pulpstone for making mechanical pulp. The annular stone itself is shown at (7) and is a single ring or a number of ring sections. The stone has a wedge-shaped cross-section and is fastened to a rosette frame (3) fixed to the grinder shaft (1), impregnated wood blocks (5) being used to hold the stone in position. The wood blocks (5) are arranged directly opposite the feed hop-



per (6), so that the latter can penetrate into the space between the frames (3) as the grinding surface of the stone becomes worn and the wood blocks (5) are cut down. A wrought iron support (4) is arranged in the rosette framework (3) for the annular-shaped stone. The advantage of this stone is that it is especially well suited for grinding operations in which the wood is fed to the stone in the hot state or under the action of steam. Max Tamaschke, Herzberg, Germany. German Patent No. 558,200.

◆ Reserve Lignin in Pinewood

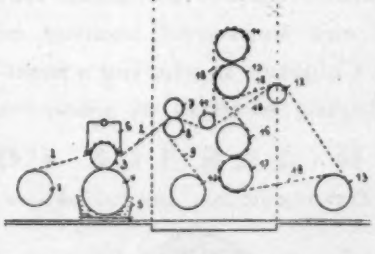
Free lignin, soluble in alcohol, is identical in composition and properties with total lignin, except for solubility. It is contained differently in the wood than insoluble lignin and can be recognized as a dark ring in the annual growth rings. It is called reserve lignin. The main portion of the lignin is, on the other hand, fixed to the wood fibers. The proportion of lignin-free fiber is determined to be 52 per cent. The lignin is generally considered to be absorbed by the fibers; actually, however, the ratio between lignin and lignin-free fiber is constant at 30:52. This seems to point not to absorption of the lignin in the fiber, but to a definite chemical compound containing lignin and fiber. When the soluble lignin content (2.5 per cent) is deducted from the total lignin, there remains 29.3 per cent of insoluble lignin. The lignin-free fiber is very stiff, and if the entire wood were composed of such fibers, the boughs and twigs of the tree would be subject to easy breaking. The greatest part of the hemicellulose, which is figured as fourteen per cent of the weight of the wood, can be hydrolyzed, and no lignin is set free in this process. Hemicellulose is, therefore, not combined with the lignin. Lignin acts to cement together the wood fibers and the great strength of wood is due to its presence. P. Klason. Svensk Papp. Tidn., volume 35, pages 152ff.

◆ Suction Box Covering

The important thing in the covering of the suction box as well as in the construction of the box itself is that the character of the same should be such that there is as little wear on the wire as possible. Leather is claimed to be the best covering available to-day. The right kind of leather must be used and when the suction box is properly constructed with its aid, the wear and tear on the leather is claimed to be small, as tests covering months of operation proved. An additional advantage is that a box may be re-leathered whenever necessary without any trouble. Each time that the wire is changed, the leather covering must be tested and any unevenness on the surface must be removed. The part of the leather covering which is subjected to the greatest wear and tear is that which comes in contact with the edges of the wire. The best practice is to cut out a section from the leather covering corresponding to this contact area, and to fasten short leather strips therein. These can then be easily removed when worn out without disturbing the main body of the covering. Wochenblatt fuer Papierfabrikation, volume 63, pages 895 to 896.

◆ Impermeable Paper

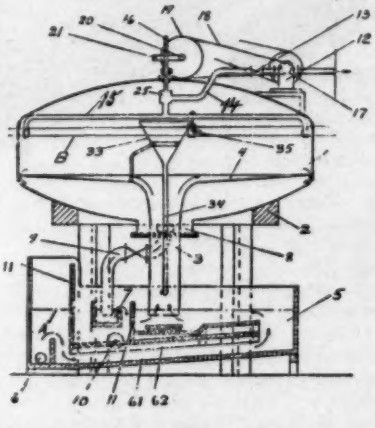
A solution of crude rubber or rubber latex is applied to the layers of paper or between the layers. Other substances are also used. The rubber solution may be mixed with various fillers, such as kaolin, starch, talc, lime, chalk, casein, etc. The apparatus for producing the paper is shown in the accompanying illustration. The paper roll is shown at (1), from which a web of paper is unwound ready for treatment. The paper



web (2) is coated with rubber latex by means of a roller (3) which obtains a film of rubber latex from the roller (4) which rotates in the container (5) holding the liquid. A regulating device (6) is used to control the portion of the circumference of the roller (3) which comes in contact with the paper web (2). The web (2) then passes between two rollers (7) and (8), where the part, coated with latex, comes in contact with a second paper web (9) which is unrolled from the paper roll (10). The two webs, between which is contained the film of rubber latex, are then led under the roller (11) either directly to the roller (12) from which they are led to the winding roller (13), or they are first passed between the pairs of dryers (14) and (15), and (16) and (17). The number of pairs of dryers may vary according to the nature of the paper, the thickness of the film of rubber latex and other conditions. In the present case, where the web (18) is composed of two layers of paper (2) and (9), it is led between the first pair of dryers (14) and (15) and then directly to the winding roller (13). Auguste Raymond, Belgium. French Patent No. 739,871.

◆ Save-All

The save-all is composed of a closed container (1), in which the white water is introduced through the inlet (3) which is located centrally in the machine and extends upwards. Air or gas is mixed with the white water. A vacuum is maintained in the container (1), so that the bubbles of gas or air



expand in the container and bring the fibers to the surface of the liquor. The fibers are removed thence through a fixed suction pipe (14), while the purified water flows out through an outlet (8), (9), (7), (6) at the lower part of the container (1). A more or less movable suction tube (15) is connected to the suction pipe (14). The former dips into the surface of the liquor in the container (1). The vertical distance between the mouth of the inlet pipe (3) and the surface of the liquor which contacts with the perforation in the suction tube (15) is made small as compared with the diameter of the container (1). The result is that the particles of fiber in the white water have no harmful, accelerated vertical motion. This aids in the separation of the fibers from the white water. Adolf M. R. Karlstroem, Hyltebruk, Sweden. German Patent No. 557,412.

DIAMOND
Liquid
CHLORINE

● **Safeguarding the quality of the paper industry . . . offering a positive and scientific control over biological growths developing in the stock during processing . . . assuring better uniformity of the stock flow . . . superior sheet formation and improved beating conditions . . . *Diamond* Liquid Chlorine is playing a most important part in the manufacturing process of numerous paper mills.**

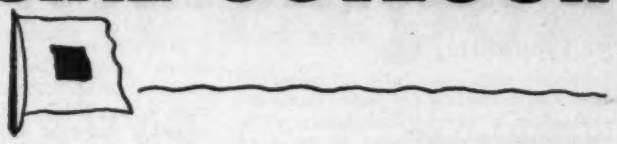
DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

CHLORINE

The COMMERCIAL OUTLOOK

New York, May 1, 1933.



FROM a sentimental viewpoint, the situation in the paper industry is registering steady and appreciable improvement. The important developments in Washington during the last month, however, have not as yet set the wheels of commerce turning much faster, though there have been distinct gains scored in manufacturing and trade in some directions. To say that the legislation passed and proposed in our national capital has been of prime import, is putting it mildly. Irrespective of political affiliations or feelings, everyone has to acknowledge that the new administration in Washington has established a remarkable record in the past two months; furthermore, there is little or no doubt expressed in a great majority of business quarters that the effect of the Government's efforts to pull the country out of the slump will soon begin to be felt in industry.

Already, it can be said, there are visible signs of bettering conditions. From numerous parts of the United States come reports of this or that manufacturing plant finding it necessary to speed up production, to augment its working force, to quicken shipments to satisfy an expanding market. The automotive industry, the steel and metal lines, textile factories and other manufactories are experiencing at least mild improvement in demand for their products, not to mention the brewing industry which is running at full tilt and which has provided stimulation of trade in many sections of the country. While it can hardly be said that the paper manufacturing industry has improved to any great degree, it is a fact that business in most classes of paper is better; there has been an actual increase in consumption of some kinds of paper and this has been followed by larger demand upon mills and distributors. The pick-up in the industry has not by any means been general, but the fact that some branches of paper business have shown more activity is regarded as a highly encouraging indication.

Sentiment within the industry is vastly improved. The opinion is freely expressed that the worst of the three-year depression is definitely past and that industry and trade is at last on the road to better things—to broader manufacturing and market activity, to larger and healthier demand based on increased consumption and revived buying power, and to a firmer and less difficult price situation growing out of the freer movement of goods and a let down in the credit tenseness. Not only is the Roosevelt administration striving to improve world trade but it is concentrating on bringing the domestic situation out of the mire of inactivity and despondency. Recent legislative measures have as their particular purpose the revival of business within the United States, and the common belief is that the will and ability of the Washington authorities are such that success will be attained in reestablishing industry and trade on more normal levels in the not distant future.

It appears virtually certain that higher prices are to be seen on wood pulp as a result of the inflationary measures driving up Scandinavian and other European currency exchanges, and it is freely admitted by paper manufacturers that higher raw material costs will mean higher prices for paper. While paper mill proprietors are not keen about increased pulp prices, it is fully appreciated that a dollar of lower exchange value will necessarily require European producers to secure more dollars for their pulp, and that higher pulp prices must eventuate. This, it is expected, will revamp and revitalize the entire price structure within the paper industry; lead to higher prices for all kinds of paper, and result in a stronger price situation because paper manufacturers will necessarily be more on their guard in quoting on their product to consuming customers and less inclined to entertain price recessions.

There seems at present a steadier tone in paper prices. Manufacturers are much less disposed to allow concessions; many are adopting a policy of refusing flatly to accept orders except at quoted levels, in some instances quotations on certain kinds of paper have been advanced slightly, while in a great majority of cases paper mills are reluctant to book commitments for any appreciable time ahead at prevailing prices and are accepting forward orders only with the proviso that price will be named when delivery is made. In fact, numerous mills are declining to sell for more than 30 days ahead at firm prices.

The most deplorable price development has been a further cut of $5 per ton in print paper quotations, announced by the International Paper Company on April 18 and retroactive to April 1 to contract customers, and bringing the price level down to $40 a ton on standard newsprint delivered New York City, or less than $35 a ton at mills. The reduction was made by the International because of a similar reduction put into effect by several Canadian producers, according to President Graustein of the I. P. Company, and in spite of newsprint mills operating at a loss under prevailing market prices. Since this latest cut in newsprint prices, apprehension has been felt in paper circles of a possible price war in newsprint, though the recent strengthening of commodity prices apparently has relieved the tension.

Production of newsprint in the United States during March amounted to 76,566 net tons and shipments from mills were 77,857 tons, compared with 67,085 tons produced and 67,057 tons shipped in the preceding month, while Canadian production was 137,078 tons and shipments 140,694, against 125,610 tons and 120,916 tons, respectively, in February, making a total production for both countries of 213,644 tons and shipments 218,551 tons, contrasted with an output of 192,695 tons and shipments of 187,973 tons in February, according to the News Print Service Bureau. During March, 21,381 tons of newsprint were made in Newfoundland and 1,478 tons in Mexico, so that the total North American production for the month amounted to 236,503 tons, against 211,301 tons in the preceding month. The Canadian mills produced 86,306 tons less in the first three months of 1933 than in the corresponding period of last year, which was a decrease of 18 per cent. The output in the United States was 63,223 tons or 22 per cent less than in the first three months of 1932; in Newfoundland 4,932 tons or 7 per cent less, and in Mexico 805 tons more, making a total decrease of 153,656 tons or 18 per cent.

Book paper mills are reported adhering quite firmly to quoted prices on their product and to be exercising much caution in taking orders for forward delivery. Demand for book paper has shown some little expansion and reports are that certain mills have stepped up their production to at least some extent. Writing paper demand is moderately good and mills are managing to keep fairly well engaged, though curtailment of output is still in order. Prices of fine papers are decidedly firmer of tone and some lines have been advanced slightly. Little change is noted in the wrapping paper branch of the market; demand is none too satisfactory and prices are irregular though some stiffening in some quarters has been recorded. Building and sheathing papers are slow even though this is the season when they ordinarily move freer, and mills are working intermittently. Tissue papers are in little else than routine demand. Paperboards are holding their own quotably although the market has been quieter since the pre-Easter period and since the dying down of the jigsaw puzzle craze. Eastern mills continue to quote $32.50 per ton for newsboard and $27.50 for plain chipboard on a New York delivered basis.

❖ ❖ ❖

◆ JOSEPH PARKER & SON CO., New Haven, Conn., blotting paper manufacturer, announces the opening of a Chicago office at 77 West Washington Street. George B. Tapner, who has been associated with the Rochester Paper Company will be in charge.

Domestic RAW MATERIALS

◆ Papermaking Rags

In line with practically all commodities, raw materials for paper mills are exhibiting a firmer undertone; while few actual advances have as yet been registered, the tendency is stronger, sellers are assuming a more independent attitude, and it would seem that higher market levels are likely. Rags for papermaking are quoted a good deal firmer than was the case until recently. Dealers and packers are of the opinion that any change in prices in the near future will be upward, and, having experienced so long a period of low and unprofitable market levels, they are now in a great majority of cases satisfied to wait for additional developments and do not appear eager to effect sales.

Paper manufacturers in some instances are said to be manifesting more interest and to have increased their buying of rags, when enabled to get the supplies desired within the price bounds they have been willing to meet. This is particularly true as concerns certain grades of new cotton and linen cuttings. The constant preaching by dealers to their mill customers about the very small production of cuttings in clothing factories and elsewhere, and the limited stocks in the hands of packers, apparently has impressed paper manufacturers with the fact that new cuttings are not in large available supply, and demand has shown some expansion. Those grades in especially good call have stiffened a little in price during the recent sharp advancement in commodities generally, and dealers are asking 4 cents per pound f. o. b. shipping points for No. 1 white shirt cuttings, 4.75 and 5 cents for soft unbleached muslins, 3 cents for light silesias, 3 cents for blue overall cuttings, 2 cents for soft black silesias, 3.25 cents for khaki cuttings, 1.25 to 1.40 cents for fancy shirt cuttings, and around 1.10 cents for washables. Depending on the quality of packing, some of these cuttings are held at higher prices than those mentioned. New linen cuttings are selling to paper mills fairly readily, reports telling of certain fine paper plants absorbing such rags for stocking up purposes since they depleted their holdings some weeks ago during the flurry of demand for scrip paper. Dealers assert that new white linen cuttings are bringing 7 to 7.50 cents a pound in sales to mills, while grey linen are worth all of 6 to 6.50 cents.

In old rags, principal activity is noted in roofing stock. While felt mills are reported to be short of business, signs are the spring demand has occasioned some improvement in their markets, and buying of the roofing rags offered by dealers has been of sufficient volume to absorb practically all the supply in the market. If anything, prices are a trifle stronger. Mills in the East are paying 50 cents per hundred pounds f. o. b. shipping points for No. 1 classification roofing stock, and 37½ and 40 cents for No. 2 packing, while in the Middle West slightly above these figures are sometimes granted. Packers declare that roofing rags are being received in slim tonnage, and that any appreciable expansion of consuming demand would unquestionably raise the market values.

Old white cottons and thirds and blues are quiet and prices show scant change. Good quality No. 1 repacked whites are reported available to paper mills at 2.75 cents a pound at dealers' shipping points, No. 2 whites at around 1.75 cents, and repacked blues at 90 cents to $1 per hundred pounds.

◆ Old Paper

After displaying pronounced strength and a fair rise in prices, the market for waste paper has ruled quieter in recent weeks, such as ordinarily is the case at this time of the year. Mills have been less eager for additional supplies, more especially board manufacturers, whose business is understood to have shrunk to some extent since the pre-Easter season. However, not much change has occurred in market prices; while the uptrend has been checked definitely, prices of most grades have held, or very nearly held, both in the East and West. There remains a broad spread in ruling prices in New York and Chicago on certain old papers. Folded news, for example, is selling in the East at 35 cents per hundred pounds f. o. b. New York, whereas Chicago dealers are securing 60 cents for the same stock; similarly, No. 1 mixed paper is 22½ to 25 cents in the East shipping points, and 40 cents in the West. The high grades are relatively steady in value, with dealers reporting sales of No. 1 hard white shavings at a price range of 1.75 to 2 cents a pound at shipping points, No. 1 soft white shavings at 1.40 to 1.60 cents, one-cut soft white at 1.60 to 1.70 cents, and No. 1 hard white envelope cuttings at 2 to 2.10 cents. Old books and magazines are bringing 60 cents a hundred pounds f. o. b. New York, and light book stock about a dollar per ton less, while No. 1 old kraft paper is selling at 60 to 65 cents a hundred, and ordinary mixed ledgers at 55 to 60 cents.

◆ Rope and Bagging

Scrap bagging, as is the case with most articles of jute, is showing a firming price trend even though demand from paper mills is reported developing slowly. No. 1 scrap bagging is quoted at 65 cents to slightly higher per hundred pounds, and in some instances consumers are said to be paying well beyond this price for special quality packing. Roofing bagging is bringing 30 cents to a bit higher at dealers' shipping points. Gunny bagging has sold fairly freely and at steady prices though seldom to paper mills. Old rope is holding about stationary in price, supported by a fairly strong supply condition and in the face of a limited paper mill demand. Domestic No. 1 old manila rope is reported bringing 1.50 cents a pound at dealers' points, with prices varying a little above and below this figure, depending on the rope involved and its source, while foreign old manila rope is 1.35 to 1.40 cents a pound ex dock American Atlantic ports.

◆ Pulpwood

Little else than a routine demand is reported for pulpwood, grinders engaging in limited buying, and prices have recorded no changes. The tone of quotations is steadier, however.

◆ Mechanical Pulp

Mechanical pulp prices are tending upward and such slight changes as have been noted have been in a forward direction. With producers abroad and in Canada demanding higher prices for their pulp, domestic manufacturers have become encouraged and are asking above recent market levels, and are said to be receiving the increased prices. Quotations on domestic groundwood range around $19 per ton f. o. b. pulp mills, depending on the air dry test and freight to consuming centers. Canadian grinders are reported asking at least $15 a ton, in some instances $16 and $17, for prime groundwood at grinding plants on the other side of the northern border. Demand is not active yet it is said a fair amount of business is transpiring.

◆ Chemical Pulp

Taking their cue from the strong upward tendency in foreign pulps, domestic chemical pulps are showing more firmness than in some time, and while thus far no material advancement has been recorded in market levels, the trend is forward and producers are not hesitating to name higher quotations while none too eager to effect sales at the moment. Inflation will doubtless mean substantially higher prices on imported pulp, and domestic manufacturers expect a stronger market for their product if and when foreign pulp climbs in cost. Meanwhile there is a routine movement of pulp from domestic producing mills at steadily maintained prices. Prime bleached sulphite is quoted at 2 to 2.10 cents a pound ex dock Atlantic seaboard, unbleached sulphite at 1.40 to 1.75 cents, according to quality, f. o. b. pulp mills, domestic kraft at 1.25 to 1.75 cents, and bleached soda pulp at 2 cents delivered book paper mills.

◆ Chemicals

Steadiness marks quotations on papermaking chemicals and in some cases the tendency is noticeably upward. Caustic soda is 2.55 to 2.60 cents per pound for the solid product f. o. b. works, and soda ash is quoted at 1.30 cents packed in bags, at works. Domestic casein is 7.50 to 9 cents per pound, while foreign is 9 to 9.50 cents. The sulphur quotation holds at $18 per long ton at mines for large contract lots.

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Since the forsaking of the gold standard by the imposition of an export embargo on gold from the United States, the market for imported wood pulp has exhibited a very strong undertone. Unlike most commodities, chemical pulps have failed to register definite advancement, but it would appear that this has been chiefly due to the reluctance of producers abroad to quote prices, the policy adopted by pulp manufacturers in Scandinavia and elsewhere in Europe being to refrain from making firm offerings pending a settling of exchanges on more stable levels and further developments affording a more concrete idea of what the full effect on commodity prices will be.

The inflationary program of our Government, modified, controlled or whatever it may prove to be, should, and, in fact, already has, led to more equalized monetary values, which is another way of saying that the dollar should decline in value in foreign countries, and the exchanges of European and other foreign nations should advance from the low levels where they have prevailed for some time past. This will mean higher prices on wood pulp manufactured in Europe, more especially in Scandinavia, and sold to the United States by the simple expediency that with American dollars worth less in international exchange, more dollars will have to be received in payment for pulp from Europe. Producers on the other side of the Atlantic, appreciating this, promptly withdrew all offerings of pulp when the British pound sterling soared upward and other European exchanges advanced in proportion, and meanwhile it has been difficult indeed for buyers in the United States to obtain pulp in Scandinavia.

The New York market for imported pulp is featured, from a trading standpoint, by the buying interest manifested in spot stocks of both sulphite and kraft pulps held in this country. Paper manufacturers in numerous cases have inquired concerning spot supplies and have shown readiness to place orders but at no increase in price. Bids of 2.10 cents a pound have been made on prime bleached sulphite ex dock or warehouse on the Atlantic seaboard, while 1.50 to 1.60 cents has been bid on prime strong unbleached sulphite and 1.25 cents on prime Scandinavian kraft pulp. Another interesting feature has been the demand for half-prime or secondary quality pulp on the spot, prices of which have stiffened to where importers and agents are asking almost the same for such pulps as for strictly prime grades. Interest in these lower quality pulps would infer that papermakers need and want pulp but that they are indisposed to grant higher prices, and therefore are endeavoring to cover their requirements with such pulps as are to had at no advancement in cost. It is reliably understood that considerable tonnages of chemical pulp are held unsold along the Atlantic seaboard, but stocks are in firm hands and recent cables from abroad have in frequent cases raised prices on consigned lots of pulp on the spot as much as $3 per ton.

Imports of chemical pulp into the United States decreased substantially during February as compared with receipts in the preceding month. The February imports totaled 87,891 long tons of chemical pulp of all grades, according to U. S. Department of Commerce figures, valued at $3,091,882, against 124,081 tons of a value of $4,106,968 imported in January this year, and 153,546 long tons of a declared value of $5,971,780 in February, 1932. Imports during the first two months of the current year were 211,972 tons of a value of $7,198,940, contrasted with 326,775 tons of a value of $12,480,472 in the corresponding period last year. Groundwood imports in February amounted to 4,995 long tons, valued at $12,325 against 7,330 tons of a value of $134,859 in the preceding month and 17,078 tons of a value of $332,627 in the same month a year ago, while for the first two months of this year importations totaled 12,325 tons of a value of $221,087, compared with 32,559 tons of a declared value of $648,662 in the similar time of 1932.

◆ Paper

Importations of paper into the United States are still on the decline, judging from official Commerce Department figures covering the month of February. The February receipts reached a total value of $4,297,368, compared with imports valued at $5,925,682 in the preceding month, while imports during the first two months of this year had an aggregate value of $10,233,050, against $15,945,687 in the same time of 1932, and $20,791,086 in the first two months of 1931. Standard newsprint of a value of $3,741,379 comprised the great bulk of the imports of paper during February, the next item being cigarette paper.

◆ Paper Stock

Imports of rags for papermaking into the United States in February last amounted to 4,172,238 pounds, valued at $41,606, comparing with 7,692,561 pounds of a declared value of $115,672 in the same month last year, according to statistics released by the U. S. Commerce Department. During the first two months of this year imports aggregated 9,658,335 pounds, valued at $87,600, contrasted with 15,669,652 pounds of a value of $225,804 in the similar time of last year. Miscellaneous paper stock imports in February were 5,598,439 pounds of a value of $49,786, making a total of 10,988,212 pounds of a value of $107,642 in the first two months of the current year, contrasted with 23,259,255 pounds of a value of $155,815 in the corresponding period a year ago.

EXPORTS

Exports of paper from the United States scored a slight increase in value during February last as contrasted with shipments in the preceding month. The gain was small but nevertheless it may mean that the turn in the lengthy downtrend in paper exports from this country has come, particularly since market values of paper were scarcely bettered in February, so that the rise in the value of exports must represent an increase in the volume of shipments abroad. The total value of the February exportations was $1,051,360, according to U. S. Department of Commerce statistics, comparing with shipments valued at $1,011,726 in January last. Exports during the first two months of this year totaled in value $2,063,086, against $2,775,813 in the corresponding time of 1932, and $3,860,469 in the first two months of 1931.

Exports of newsprint paper in February last amounted to 600,499 pounds of a value of $15,432, and for the first two months of this year were 1,529,831 pounds, valued at $39,975, compared with 2,449,545 pounds of a value of $69,767 in the first two months of 1932. Book paper exports in the two-month period this year reached a value of $100,629, against $87,426 in the similar period a year ago, while wrapping paper shipments were valued at $209,142, contrasted with $221,896 last year. Writing paper was exported to a value of $114,298 in the first two months of 1933, against $157,867 last year in the same period; cover paper, $15,894, against $23,025; tissue and crepe paper, $104,924, against $44,952; sheathing and building paper, $18,893, against $35,968; boxboard, $78,503, against $242,847; other paperboard, $120,770, against $125,477; paper bags, $84,542, against $85,538, and paper boxes and cartons, $71,891, against $108,896.

Exports of paper base stocks in February last were valued at $167,001, contrasted with $254,727 in the same month last year.

It's no fun to be fooled*

. . . when you buy corrosion resistant alloy castings

A trick frequently employed in selling chromium-nickel alloy castings to the sulphite industry is to create the illusion that corrosion resisting properties are due to some particular type of melting equipment, heat treatment, special alloy addition, or mysterious manufacturing process.

EXPLANATION

In certain of the chromium-nickel-iron alloys (18-8 for example) a combination of low carbon content and heat treatment are necessary to develop maximum resistance. But low carbon content will not in itself insure satisfactory performance, nor will heat treatment make a poor casting good regardless of carbon or other alloy content. MISCO "C" depends upon neither subnormally low carbon content nor metallurgical hocus-pocus—yet no MISCO "C" casting has ever corroded in a sulphite pulp mill.

The story of MISCO "C" is told in Bulletin No. 5. Your copy will be mailed on request.

MICHIGAN STEEL CASTING CO.
1992 GUOIN ST., DETROIT, MICH.

MISCO "C"

THE CORROSION RESISTANT ALLOY

Apologies to* **CAMEL *Cigarettes*

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

CANTON, MASS.

Woolen Manufacturers Since 1856

REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich. INTERNATIONAL TRADING CO., Philadelphia, Pa.

PACIFIC SALES COMPANY, Security Bldg., Portland, Ore.

Index to Advertisers' Products, Classified

Acid Resisting Bronze
Carthage Machine Co.
Eastwood-Nealley Corp.

Adhesives
Corn Products Refin'g Co.

Agitator Equipment
Carthage Machine Co.
E. D. Jones & Sons Co.
Moore & White Co.
New England Tank & Tower Co.

Air Compressors
J. T. Ryerson & Son, Inc.

Air Cond'g & Control App.
J. O. Ross Eng. Corp.

Air Dryers & Heaters
J. O. Ross Eng. Corp.

Air Valves
Hudson-Sharp Mach. Co.

Air Washers
J. O. Ross Eng. Corp.

Alkali
Diamond Alkali Co.

Aprons (Fourdrinier)
B. F. Goodrich Rub. Co.

Architects
Ferguson Engineers
Hardy S. Ferguson
George F. Hardy
V. D. Simons

Assorting Tables
Moore & White Co.

Babbitt Metal
Eastwood-Nealley Corp.
J. T. Ryerson & Son, Inc.

Barkers (Disc)
Carthage Machine Co.

Bearings
Jeffrey Mfg. Co.
Link-Belt Company

Bearings (Babbitt)
E. D. Jones & Sons Co.
Link-Belt Company
J. T. Ryerson & Son, Inc.

Bearings (Cutless Rubber)
B. F. Goodrich Rub. Co.

Bearings (Roller)
Link-Belt Company
Rollway Bearing Co., Inc.

Bearings (Thrust)
Rollway Bearing Co., Inc.

Beating, Washing and Bleaching Engines
Downingtown Mfg. Co.
E. D. Jones & Sons Co.

Belt Drives
Dodge Mfg. Corp.
Link-Belt Company

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing
Flexible Steel Lacing Co.

Belting (Rubber)
Dayton Rubber Mfg. Co.
B. F. Goodrich Rub. Co.

Belting (Silent Chain)
Link-Belt Company

Belts (V)
Dayton Rubber Mfg. Co.

Bleach Ejectors
B. F. Perkins & Sons, Inc.

Bleaching Systems
Moore & White Co.

Blowers
J. O. Ross Eng. Corp.
J. T. Ryerson & Son, Inc.

Blow-Off Valves
Eastwood-Nealley Corp.

Board Machines
Beloit Iron Works
Downingtown Mfg. Co.

Boiler Tubes & Fittings
J. T. Ryerson & Son, Inc.

Buckets (Elevator)
B. F. Goodrich Rub. Co.
Jeffrey Mfg. Co.
Link-Belt Company

Bulkers
B. F. Perkins & Son, Inc.

Bundling Presses
Hudson-Sharp Mach. Co.
Paper Conv'ting Mach. Co.

Calender Cooling
J. O. Ross Eng. Corp.

Calender Doctors
Beloit Iron Works

Calender Roll Grinders
Lobdell Car Wheel Co.

Calender Rolls
Lobdell Car Wheel Co.
B. F. Perkins & Son, Inc.

Calenders
Beloit Iron Works
Downingtown Mfg. Co.
Lobdell Car Wheel Co.
B. F. Perkins & Son, Inc.

Calipers (Roll)
Lobdell Car Wheel Co.

Castings (Brass)
Eastwood-Nealley Corp.

Castings (Bronze)
Eastwood-Nealley Corp.

Castings (Corrosion Resist.)
Carthage Machine Co.
Michigan Steel Casting Co.

Castings (Grey Iron)
Beloit Iron Works
Jeffrey Mfg. Co.
Link-Belt Company

Castings (Steel & Semi-Steel)
Link-Belt Company

Castings (Sulphite Mill)
Michigan Steel Casting Co.

Caustic Soda
Diamond Alkali Co.
Grasselli Chemical Co.

Chain Drives
Jeffrey Mfg. Co.
Link-Belt Company

Chains
Jeffrey Mfg. Co.
Link-Belt Company
J. T. Ryerson & Son, Inc.

Chemicals
Diamond Alkali Co.
Grasselli Chemical Co.
Titanium Pigment Co.

Chilled Iron Rolls
B. F. Perkins & Son, Inc.

Chip Crushers
Carthage Machine Co.

Chippers
Carthage Machine Co.

Chromium Plating
Chromium Corporation of America

Clutches
Dodge Mfg. Corp.
Link-Belt Company
Moore & White Co.

Coal & Ash Hand. Systems
Jeffrey Mfg. Co.
Link-Belt Company

Cogs
N. P. Bowsher Co.

Concrete Reinforcing Steel
J. T. Ryerson & Son, Inc.

Consulting Engineers
See Engineers

Conveyors
Jeffrey Mfg. Co.
Link-Belt Company

Conveyors (Belt)
B. F. Goodrich Rub. Co.
Jeffrey Mfg. Co.
Link-Belt Company

Conveyors (Trim)
J. O. Ross Eng. Corp.

Core Winding Machines
Hudson-Sharp Mach. Co.

Corrugated Sheet Metal
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Cotton Rolls
B. F. Perkins & Son, Inc.

Couplings
E. D. Jones & Sons Co.
Link-Belt Company

Cranes (Crawling Tractor)
Link-Belt Company

Cranes (Electric)
Link-Belt Company

Cranes (Locomotive)
Link-Belt Company

Crepe Machines
Hudson-Sharp Mach. Co.

Crushers (Coal & Coke)
Jeffrey Mfg. Co.
Link-Belt Company

Cutters
Beloit Iron Works
Cameron Machine Co.
Samuel M. Langston Co.

Cylinder Machines
Beloit Iron Works
Downingtown Mfg. Co.

Cylinder Molds (New or Repaired)
Beloit Iron Works
Carthage Machine Co.
Eastwood-Nealley Corp.

Dampeners
B. F. Perkins & Son, Inc.

Dandy Rolls
Eastwood-Nealley Corp.

Doctor Blades
B. F. Goodrich Rub. Co.

Dryer Temperature Control
The Bristol Co.

Dryers
Beloit Iron Works

Drying Machines
J. O. Ross Eng. Corp.

Drying Systems
J. O. Ross Eng. Corp.

Dusters
Carthage Machine Co.
E. D. Jones & Sons Co.
Moore & White Co.

Dyestuffs
du Pont de Nemours & Co., Inc., E. I.

Economizers
J. O. Ross Eng. Corp.

Electric Drives
Westinghouse Electric & Mfg. Co.

Electrical Machinery
Westinghouse Electric & Mfg. Co.

Elevators
Jeffrey Mfg. Co.
Link-Belt Company

Embossing Machines
Hudson-Sharp Mach. Co.
B. F. Perkins & Son, Inc.

Engineers
Ferguson Engineers
Hardy S. Ferguson
George F. Hardy
V. D. Simons

Engineers (Drying)
J. O. Ross Eng. Corp.

Engineers (Heating and Ventilating)
J. O. Ross Eng. Corp.

Exhausters
J. O. Ross Eng. Corp.

Fans
B. F. Perkins & Son, Inc.
J. O. Ross Eng. Corp.

Fans (Ventilating)
B. F. Perkins & Son, Inc.

Felt Drying System
J. O. Ross Eng. Corp.

Felt & Wire Guides
Moore & White Co.

Felts (Cotton)
Fitchburg Duck Mills

Felts (Jacket)
Appleton Woolen Co.
Bulkley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

Felts (Woolen)
Appleton Woolen Co.
Bulkley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

Floor Plates (Safety)
J. T. Ryerson & Son, Inc.

Fourdrinier Machines
Beloit Iron Works
Downingtown Mfg. Co.
Moore & White Co.

Friction Calenders
B. F. Perkins & Sons, Inc

Galvanized Sheets (Iron & Steel)
American Rolling Mill Co.
American Sheet & Tin Plate Co.

Gauges (Pressure)
The Bristol Co.
Taylor Instrument Co.

Gauges (Vacuum)
The Bristol Co.
Taylor Instrument Co.

Gears
Dodge Mfg. Co.
Jeffrey Mfg. Co.
E. D. Jones & Sons Co.
Link-Belt Company

Gears (Herringbone)
Link-Belt Company

Gears (Silent Chain)
Link-Belt Company

Gears (Worm)
Beloit Iron Works
Link-Belt Company

Generating Sets
Westinghouse Electric & Mfg. Co.

Generators (Turbo)
Westinghouse Electric & Mfg. Co.

Granite Rolls
Beloit Iron Works
B. F. Perkins & Son, Inc

Grease Cups
Link-Belt Company

Grinders (Pulp)
Carthage Machine Co.

Grinding Wheels
Carborundum Co.
Norton Co.

Hangers
Dodge Mfg. Co.
Link-Belt Company

Heaters (Unit)
J. O. Ross Eng. Corp.

Heaters (United Steam, Fan Blast)
J. O. Ross Eng. Corp.

Heating Systems
J. O. Ross Eng. Corp.

Hoists (Chain)
J. T. Ryerson & Son, Inc

Hoists (Electric)
J. T. Ryerson & Son, Inc

Hoists (Portable, Air and Steam)
J. T. Ryerson & Son, Inc.

Hoods (Paper Machine)
J. O. Ross Eng. Corp.

Hose
B. F. Goodrich Rub. Co.

Hydrators
Love Brothers, Inc.

Hydrogen—Ion Apparatus
LaMotte Chem. Prod. Co.

Hydrometers
Taylor Instrument Co.

Hygrometers
Taylor Instrument Co.

Indicators (CO_2, NH_3, SO_2, etc.)
The Bristol Co.

Indicators (Super Heat)
Taylor Instrument Co.

Iron & Steel Supplies
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Jordan Engines
E. D. Jones & Sons Co.

Kneaders
E. D. Jones & Sons Co.

Knotter
Moore & White Co.

Layboys
Moore & White Co.

Machine Shop Equipment
J. T. Ryerson & Son, Inc.

Mechanical Draft Apparatus
Jeffrey Mfg. Co.

Meters (Flow)
Taylor Instrument Co.

Micrometer Roll Calipers
Lobdell Car Wheel Co.

Mill Cogs
N. P. Bowsher Co.

Motor Cooling
J. O. Ross Eng. Corp.

Motor Generator Sets
Westinghouse Electric & Mfg. Co.

Motors
Westinghouse Electric & Mfg. Co.

Mullen Testers
B. F. Perkins & Son, Inc.

Napkin Folders
Hudson-Sharp Mach. Co.
Paper Conv'ting Mach. Co.

Packing (Asbestos)
B. F. Goodrich Rub. Co.

Paper Calender Rolls
B. F. Perkins & Son, Inc.

Paper Cutters & Slitters
Beloit Iron Works
Cameron Machine Co.
Hudson-Sharp Mach. Co.
Samuel M. Langston Co.
Moore & White Co.

Paper Dampeners
B. F. Perkins & Son, Inc.

Paper Distributers
Perkins-Goodwin Co.

Paper Folders
Hudson-Sharp Mach. Co.

Paper Machine Drives
Beloit Iron Works
Link-Belt Company
Moore & White Co.
Westinghouse Electric & Mfg. Co.

Paper Machines
Beloit Iron Works
Downingtown Mfg. Co.

Paper Manufacturers
Hammermill Paper Co.

Paper Manufacturers' Supplies
Diamond Alkali Co.
Perkins-Goodwin Co.

Paper Testing Machinery
B. F. Perkins & Son, Inc.

pH Equipment
LaMotte Chem. Prod. Co.

Pipe
National Tube Co.
J. T. Ryerson & Son, Inc.

Pipe (Spiral Welded)
American Rolling Mill Co.

Pipe Systems Installed
Pittsburgh Piping & Equipment Co.

Pipe & Tubes (Stainless)
National Tube Co.

Piping Equipment
Pittsburgh Piping & Equipment Co.

Platers
B. F. Perkins & Son, Inc.

Plates (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Plating (Chromium)
Chromium Corporation of America

Pneumatic Tools
J. T. Ryerson & Son, Inc.

Power Transmission
Dodge Mfg. Corp.
Jeffrey Mfg. Co.
Link-Belt Company

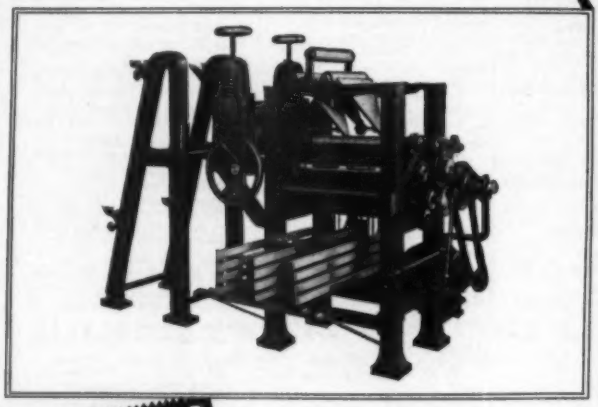
Press Rolls
B. F. Perkins & Son, Inc.

Press Rolls (Granite)
Beloit Iron Works
B. F. Perkins & Son, Inc.

Process Controller (Time Cycle)
The Bristol Co.

Pulleys
Carthage Machine Co.
Dodge Mfg. Corp.
E. D. Jones & Sons Co.
Link-Belt Company

New TWIN BALL BEARING ROTARY NAPKIN FOLDER



700 EMBOSSED OR PLAIN QUARTER FOLD NAPKINS PER MINUTE! Guaranteed PRODUCTION SPEED

Here is a napkin folder that can deliver the production we say it will—and more. Designed especially for greater production, it will help you bring down production costs, and give you years of satisfactory service. Heavily constructed, it has a number of improvements over former plain bearing machines. Easily adjusted operating shear cut; the special delivery rollers assure an accurately and uniformly delivered pack.

Be sure to get the facts on this efficient and dependable machine, built on the rotary principle for economy in operation and constant steady production. Complete information is yours upon request.

Paper Converting Machine Company
GREEN BAY WISCONSIN

Designers and manufacturers of High Speed Rotary Folders for napkins, towels and toilet paper; Rotary printing presses for napkins, bags, envelopes, creping machines, bundling presses and special converting machinery.

"PAPER CONVERTING" SPEED ROTARY PRINCIPLE SERVICE

AMERICAN USS STAINLESS AND HEAT RESISTING STEEL SHEETS AND LIGHT PLATES

AMERICAN SHEET AND TIN PLATE COMPANY PITTSBURGH

In the Paper Making Industry

Insist upon USS Stainless Steel Sheets—produced in a number of grades and finishes, and adapted to a wide range of applications. Write for literature and full information on the following alloys—

USS Chromium-Nickel Steels, *Austenitic:* 18-8; 18-12; 25-12.
USS Chromium-Alloy Steels, *Ferritic:* 12; 17; 27.

USS Chromium-Nickel Alloy Steels produced under licenses of Chemical Foundation, Inc., New York; and Fried. Krupp A. G. of Germany.

This Company also manufactures high grade Black and Galvanized Sheets, Tin and Terne Plates for all known uses.

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

1864 *The Qualifications of* 1933

EXCELSIOR FELTS

are embodied in their name

Elimination of felt marks
Xactly as you want them
Carefully manufactured
Easy starting and non-blowing
Lasting qualities
Satisfying performance
Immeasurably successful
Order today and
Reduce your felt costs

CYLINDER WETS
(Open and water shedding)

69 years of experience in felt manufacture.
Maximum tonnage obtained if run over

EXCELSIOR FELTS

Manufactured by

KNOX WOOLEN COMPANY
CAMDEN, MAINE

Sold by

BULKLEY, DUNTON & COMPANY
75 Duane St., New York, and direct

Pulp (Chemical)
Perkins-Goodwin Co.

Pulp Stones
Carborundum Co.
Norton Co.

Pulp Thickeners
Carthage Machine Co.
Moore & White Co.

Pulpwood Stackers
Jeffrey Mfg. Co.
Link-Belt Company

Pumps (Boiler Feed)
Buffalo Pumps, Inc.

Pumps (Centrifugal)
Buffalo Pumps, Inc.
Carthage Machine Co.

Pumps (Stock)
American Paper Mach. & Eng. Works
Beloit Iron Works
Buffalo Pumps, Inc.
Downingtown Mfg. Co.
Moore & White Co.

Pyrometers
The Bristol Co.
Taylor Instrument Co.

Rag Cutters
B. F. Perkins & Sons, Inc.

Recorders (CO_2, NH_3, SO_2, etc.)
The Bristol Co.

Recorders (Liquid Level)
The Bristol Co.

Recording Instruments (Temperature, Pressure, Humidity, Flow)
The Bristol Co.
Taylor Instrument Co.

Recovery Systems (Chemical Pulp)
J. O. Ross Eng. Corp.

Reels
Beloit Iron Works
Moore & White Co.

Reels (Automatic Collapsing)
Hudson-Sharp Mach. Co.

Refiners
E. D. Jones & Sons Co.
Lowe Brothers, Inc.

Regulators (Pressure and Temperature)
The Bristol Co.
Taylor Instrument Co.

Rewinders
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.

Roll Grinding Machines
Lobdell Car Wheel Co.

Roll Stands
Cameron Machine Co.

Roller Bearing Units
Dodge Mfg. Corp.

Rolls
Beloit Iron Works
Carthage Machine Co.
Downingtown Mfg. Co.
Lobdell Car Wheel Co.
B. F. Perkins & Sons, Inc.

Rolls (Embossing)
Hudson-Sharp Mach. Co.
B. F. Perkins & Sons, Inc.

Rolls (Rubber Covered)
Beloit Iron Works
B. F. Goodrich Co.

Roof Drying Systems
J. O. Ross Eng. Corp.

Roofing & Siding (Iron & Steel)
American Rolling Mill Co.

Rotary Printing Units
Hudson-Sharp Mach. Co.
Paper Conv'ting Mach. Co

Safety Treads
J. T. Ryerson & Son, Inc.

Save-Alls
Carthage Machine Co.
Moore & White Co.

Saws
J. T. Ryerson & Son, Inc.

Screen Diaphragms
B. F. Goodrich Rub. Co.

Screens
Downingtown Mfg. Co.
E. D. Jones & Sons Co.

Screens (Chip)
Carthage Machine Co.

Screens (Rotary)
American Paper Mach. & Eng. Works
E. D. Jones & Sons Co.
Moore & White Co.

Separators (Chip)
Carthage Machine Co.

Shafting
Link-Belt Company
J. T. Ryerson & Son, Inc.

Shafts (Collapsible)
Cameron Machine Co.
Moore & White Co.

Sheet Metal (Annealed)
American Rolling Mill Co.

Sheet Metal Work
J. O. Ross Eng. Corp.

Sheets (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Sheets (Stainless Steel)
American Sheet & Tin Plate Co.

Shower Pipes
Beloit Iron Works
Moore & White Co.

Shredders
Carthage Machine Co.
E. D. Jones & Sons Co.

Silent Chain Drives
Jeffrey Mfg. Co.
Link-Belt Company

Silicate of Soda
Grasselli Chemical Co.
Philadelphia Quartz Co.

Slitting & Rewinding Mach.
Beloit Iron Works
Cameron Machine Co.
Hudson-Sharp Mach. Co.
Samuel M. Langston Co.
Moore & White Co.

Soda Ash
Diamond Alkali Co.
Grasselli Chemical Co.

Special Machinery
Beloit Iron Works
Hudson-Sharp Mach. Co.
E. D. Jones & Sons Co.

Speed Reduction Units
Link-Belt Company

Splitters (Wood)
Carthage Machine Co.

Sprockets
Jeffrey Mfg. Co.
Link-Belt Company

Stainless Steel Sheets
American Sheet & Tin Plate Co.

Starch
Corn Prod. Refining Co.

Steam Meters
The Bristol Co.

Steel (Bars, Shapes, Plates, Sheets, Etc.
Joseph T. Ryerson & Son

Stock Cutters
B. F. Perkins & Son, Inc.

Stokers
Westinghouse Electric & Mfg. Co.

Strainers
Carthage Machine Co.

Stuff Chests
E. D. Jones & Sons Co.
Moore & White Co.

Stuff Pumps
Beloit Iron Works
Moore & White Co.

Suction Boxes
Beloit Iron Works
E. D. Jones & Sons Co.
Moore & White Co.

Sulphite (Strong Bleached & Easy Bleaching)
Perkins-Goodwin Co.

Sulphite Fittings
Eastwood-Nealley Corp.

Sulphur Burners
American Paper Mach. & Eng. Works
Carthage Machine Co.

Supercalenders
B. F. Perkins & Son, Inc.

Tachometers & Tachographs
The Bristol Co.

Tank Lining (Rubber)
B. F. Goodrich Rub. Co

Tanks & Vats (Wood)
New England Tank & Tower Co.

Tensile Strength & Stretch Testers
B. F. Perkins & Son, Inc

Testers (Bursting Strength)
B. F. Perkins & Son, Inc

Thermometers
The Bristol Co.
Taylor Instrument Co.

Toilet Machine (Hard & Soft Roll)
Hudson-Sharp Mach. Co

Towel (Interfolding Machine)
Hudson-Sharp Mach. Co

Transmission (Variable Speed)
Moore & White Co.

Trolleys (I-Beam)
J. T. Ryerson & Son, Inc

Turbine (Steam)
Westinghouse Electric & Mfg. Co.

Valve Balls & Discs
B. F. Goodrich Rub. Co.

Valve Specialties
Eastwood-Nealley Corp.
Jenkins Bros.

Valves
Carthage Machine Co.
Eastwood-Nealley Corp.
Jenkins Bros.

Valves (Digester)
Eastwood-Nealley Corp.

Valves (Gate)
Jenkins Bros.

Valves (Non-return; Emergency Stop)
Jenkins Bros.

Valves (Quick Opening)
Eastwood-Nealley Corp.

Valves (Relief)
Jenkins Bros.

Valves (Stock)
Eastwood-Nealley Corp.

Vapor Absorption Systems
J. O. Ross Eng. Corp.

Ventilating Fans
B. F. Perkins & Son, Inc.

Ventilating Systems
Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.

Washers
Moore & White Co.

Washers (Wood)
Carthage Machine Co.

Wet Machines
Downingtown Mfg. Co.

Winder Shafts
Cameron Machine Co.
Downingtown Mfg. Co.
Moore & White Co.

Winders
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co
Moore & White Co.

Wire, Steel (Plain or Coated)
J. T. Ryerson & Son, Inc.

Wires (Paper Machine)
Eastwood-Nealley Corp.

Wood Grapples
Link-Belt Company

Obtainable through your supply house

Fig. 106-A
Globe, Screwed

Quality pays even today

There is QUALITY in Fig. 106-A Jenkins Bronze Globe Valve ...extra deep stuffing box...slip-on stay-on disc holder...one-piece screw-over bonnet...Jenkins Disc.

JENKINS BROS.
80 White St., New York, N.Y.
Bridgeport, Conn., Boston, Mass.
Chicago, Ill., Philadelphia, Pa.

Jenkins
BRONZE IRON STEEL
VALVES
Since 1864

Always marked with the "Diamond"

SPECIAL
PAPER STARCH

For many years the reliable beater starch. Also STARCHES and GUMS of quality, with economy, for tub and calender sizing.

Manufactured by
CORN PRODUCTS REFINING COMPANY
17 Battery Place New York, N.Y.

Fitchburg Duck Mills

FITCHBURG, MASS.

manufacturers of

Triune and Multiple Ply
Canvas Dryer Felts

Fine Faced "English Woven" Felts for Fine Papers
in Three, Four, Five and Six Ply 60 Inches
to 288 Inches in Width

Absolutely No Felt Marks in Paper

TRIUNE Three Ply Felts for extra long service and large production

LaMotte Service
in the Pulp and Paper Industry

pH Control—Boiler Feed Water Control—Chlorine Control

Standard Routine Tests Developed by LaMotte Research Department Promote Better Control in Maintenance of

—Uniform High Quality of Finished Product
—Economical Utilization of Chemicals and Raw Materials
—Prevention of Corrosion of Boilers, Machines and

pH CONTROL
- **in the Beaters**
- **in the Sizing**
- **in Filling, Coating and Coloring**
- **in Eliminating Deposition of Pitch on Wires, Rolls and Felts**
- **in White Water Recovery**
- **in Quality of Mill Water Supply**
- **in Finished Paper**

CHLORINE CONTROL
- **in Treating Mill Water Supply, etc.**

BOILER FEED WATER CONTROL
- **Simplified Outfits for Controlling Treated Water or in Analyzing Untreated Water for:**
- **Alkalinity . . . Chlorides**
- **Dissolved Oxygen**
- **Hardness . . . Phosphates**
- **pH . . . Sulphates**

Remember, all of the above tests have been developed in close cooperation with authorities in these fields. The equipment has been standardized and designed for the specific purpose for which it is intended.

LaMotte Outfits are accurate, they are inexpensive, and they are easy to operate.

We will gladly cooperate with paper mills anywhere, supplying definite data concerning the application of the above tests to their specific problems. There is no obligation imposed upon any mill enjoying this service—simply write us, outlining the nature of the operations involved, pointing out where control tests are desired. Our research department will send you a special report without charge.

LaMOTTE CHEMICAL PRODUCTS CO.
436 LIGHT ST. BALTIMORE, MD.

ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE
STEEL BELT LACING
NEARLY a thousand belts per hour are laced with Alligator Steel Belt Lacing, day in day out, year in year out. Easy, rapid application with a hammer as the only tool; the hammer-clinched, vise-like grip on the belt ends, preventing friction of the plies; the patented, sectional, steel rocker pin which absorbs friction in the hinged joint; the great surplus of strength and long service—only Alligator Steel Belt Lacing combines these features which make it the choice of millions of belt users. Smooth on both sides. Easily separable. Reliable both on light and heavy duty drives. Eleven sizes. Made also in Monel Metal. Sold at wholesale and retail throughout the world.
FLEXIBLE
STEEL LACING CO.
4675 Lexington Street, Chicago
In England at 133 Finsbury Pavement, London, E. C. 2.
JUST A HAMMER TO APPLY IT

Alphabetical Index to Our Advertisers

When writing them, please mention The Paper Industry

American Paper Mach'y & Eng. Wks. 98
American Pulp & Paper Mill Superintendents Association, The 68
American Rolling Mill Co., The 95
American Sheet & Tin Plate Co. 110
Appleton Woolen Mills ..... Inside Back Cover
Beloit Iron Works
Bowsher Co., The N. P. 98
Bristol Co., The
Buffalo Pumps, Inc. 100
Bulkley, Dunton & Co. 110
Cameron Machine Co. 113
Carborundum Co., The 71
Carthage Machine Co. 96
Chromium Corp. of America
Corn Products Refining Co. 111
Dayton Rubber Mfg. Co., The 65
Diamond Alkali Co. 104
Dodge Mfg. Corp. 67
Downingtown Mfg. Co.
Draper Bros. Co. 108
du Pont de Nemours & Co., Inc., E. I. 59
Eastwood-Nealley Corp. ..... Front Cover
Ferguson Engineers 98
Ferguson & Co., Hardy S. 98
Fitchburg Duck Mills 112
Flexible Steel Lacing Co. 112
Goodrich Rubber Co., The B. F. 69
Grasselli Chemical Co., The 73
Hammermill Paper Co.
Hardy, George F. 98
Hudson-Sharp Machine Co. 100
Huyck & Sons, F. C. 60
Jeffrey Mfg. Co., The
Jenkins Bros. 111
Jones & Sons Co., E. D. 62
Knox Woolen Co. 110
La Motte Chemical Products Co. 112
Langston Co., Samuel M. 96
Link-Belt Company.... Inside Front Cover
Lobdell Car Wheel Co. 94
Lockport Felt Co. 94
Love Brothers, Inc. ..... Back Cover
Michigan Steel Casting Co. 108
Moore & White Co. 98
National Safety Council 114
National Tube Co.
New England Tank & Tower Co.
Norton Company
O'Reilly, Philip 72
Orr Felt & Blanket Co., The 97
Paper Converting Machine Co. 110
Paper & Pulp Mill Catalogue 114
Perkins & Son, Inc., B. F. 96
Perkins-Goodwin Co. 98
Philadelphia Quartz Co. 99
Pittsburgh Piping & Equipment Co. 98
Rollway Bearing Co., Inc. 96
Ross Engineering Corp., J. O. 74
Ryerson & Son, Inc., Joseph T. 99
Shuler & Benninghofen 70
Simons, V. D.
Taylor Instrument Companies 61
Titanium Pigment Co.
Waterbury Felt Co. 100
Westinghouse Elec. & Mfg. Co.

CAMACHINE 19
HIGH SPEED WINDER FOR NEWSPRINT, BOOK, KRAFT AND BOARD MILL SERVICE.
WIDTHS 100" TO 200". SPEEDS UP TO 2800 F.P.M. MAXIMUM
REWIND DIAMETER 40".
NEW FEATURE FOR REVERSING WEB IN WINDING
PATENTED METHOD WINDS ROLLS WIRE SIDE OUT IF REQUIRED
CAMERON MACHINE COMPANY 61 POPLAR ST. BROOKLYN, N.Y.

GET THE FACTS

THERE is an old saying among engineers that every engineer should have his own note book. It is from such a note book that unusual facts pertaining to the engineer's specific job may be obtained.

¶ The Paper and Pulp Mill Catalogue is not published to take the place of the engineer's individual note book but rather to enhance it and to serve others as well. Every Engineer, Production Executive, and Purchasing Executive in the pulp and paper mills of the United States and Canada can "Get The Facts" for many of their perplexing problems by referring to this book. A copy of the 1933 edition will soon be available to you.

» » » Address all communications to the « « «

PAPER AND PULP MILL CATALOGUE

333 N. Michigan Avenue, Chicago, Illinois

Is *Your* Safety Program Paying *Maximum* Dividends?

DURING the 1931-32 Paper Industry Safety Contest, nine paper, pulp, bag and container mills completed the 12 months' period *without a single lost-time injury*—an aggregate of two and one-half million man hours worked safely. These mills furnish nine perfect illustrations of the maximum dividends to be reaped from a successful safety program.

Similarly, in the Paper and Pulp Section of the National Safety Council, 100 companies that have reported experience over a five-year period can point to a reduction of *one-half* in accident frequency and severity rates, as the dividends paid by their safety programs.

In 1933, every company in the industry should follow the lead that Safety offers to reduce accident costs. The National Safety Council will gladly outline, without obligation upon request, the methods any company can adopt that will result in this desired cost reduction.

National Safety Council

INCORPORATED

20 North Wacker Drive Chicago